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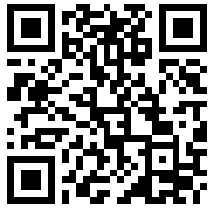

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THE

# RAILWAY MAGAZINE

VOL. XXXIX.

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## What the Railways are Doing

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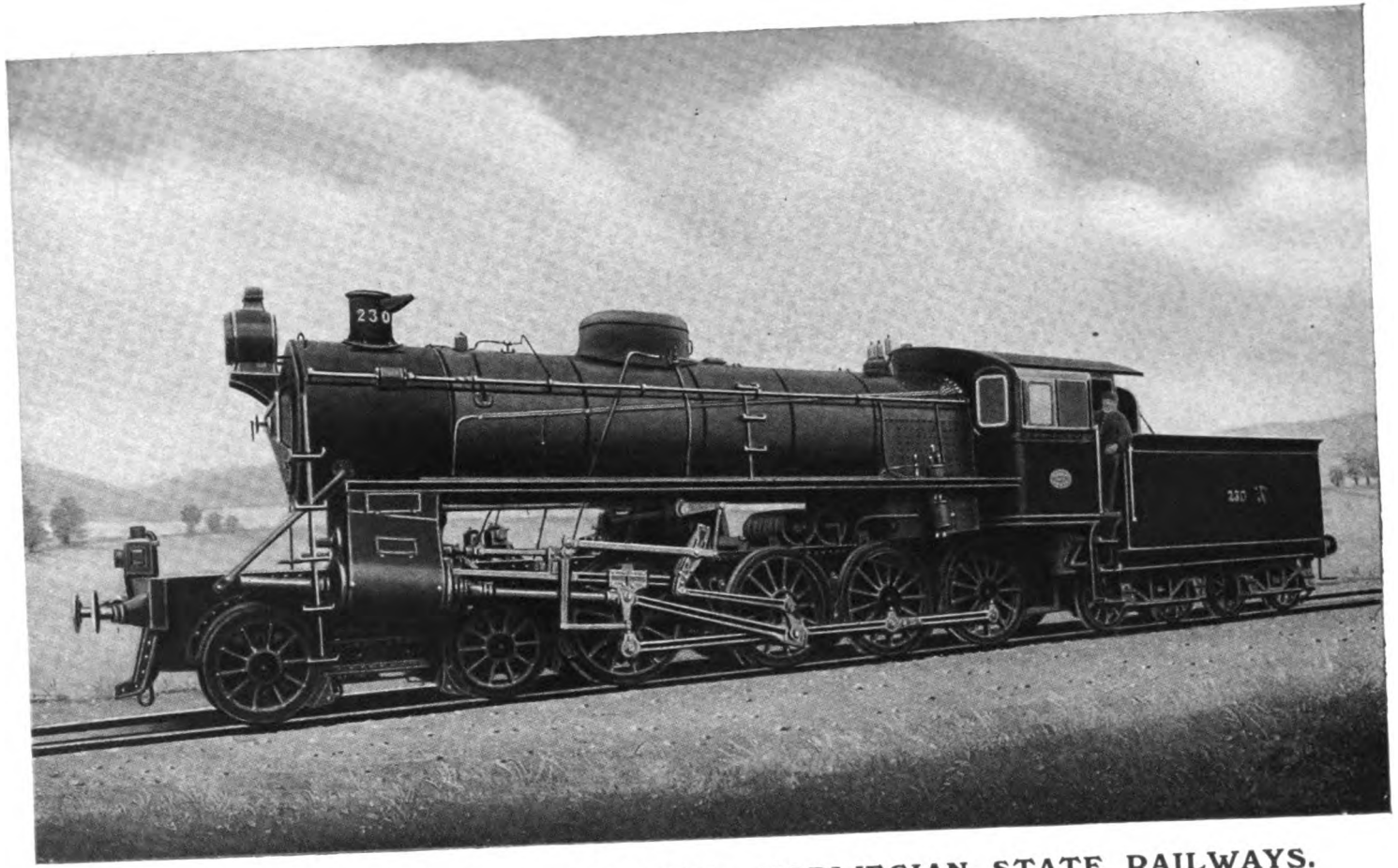


## 4-8-0 SUPERHEATER LOCOMOTIVE: NORWEGIAN STATE RAILWAYS.

As used on the steep grades of the Bergen-Christiania Line.

Cylinders (4), 15⅝ in. by 24 in.; coupled wheels, 4 ft. 6 in.; steam pressure, 170 lbs. per sq. in.; heating surface, tubes, 1,447 sq. ft.; firebox, 105 sq. ft.; superheater, 410 sq. ft.; grate area, 30·5 sq. ft.

Built at the Thunes Engineering Works, Christiania, 1911.

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A STRIKING VIEW OF GUSTA MOUNTAIN, NORWAY.

# The Bergen-Christiania Railway and its Traffic Value.

By FJELDSÆTER.

THE October (1915) number of the RAILWAY MAGAZINE contained an article dealing with the new route to Russia and the East *viâ* Newcastle-on-Tyne and Norway, the service of the B. and N. line of steamers to Bergen being principally considered.

In view of the importance that this route to Norway, Sweden, Russia and the Far East will have in peace time (as travelling through Germany will doubtless as far as possible be avoided), it is proposed to describe briefly this fine example of Norwegian engineering skill, the comparatively new railway—it is five years old—between Bergen and Christiania, which has made this new route possible.

What first strikes the would-be passenger when making arrangements for his journey is that the time occupied by the fastest train from Bergen—the night express—is 12 hours for the journey of 307 miles, but those who have made the journey know, and others will understand by a glance at the profile map, that the engine has to haul the train from sea level to an altitude exceeding 4,300 ft., far above the tree-line crossing the regions of eternal ice and snow, in order to accomplish its journey over the mountains. Travellers not pressed for time should travel by the day train, as the magnificent and varied scenery viewed from the fine modern carriages of the Norwegian State Railways is most entrancing and will amply repay a visit to Norway even solely for this trip.

The first section of the line skirts picturesque fjords, runs through gorges and tunnels, along the sides of cliffs which, in many cases, rise like a wall direct from the fjord. The landscape presents an infinite variety of transformations. We see bold headlands running out into the fjord, farms apparently suspended from the mountain sides, rocky passes and dizzy heights, down whose sides fleecy waterfalls descend.

The second section is the mountain crossing. The rails follow as much as possible the mountain valleys, going from valley to valley by means of tunnels through the solid rock. About one-fifth of the entire distance between Voss and Myrdal consists of



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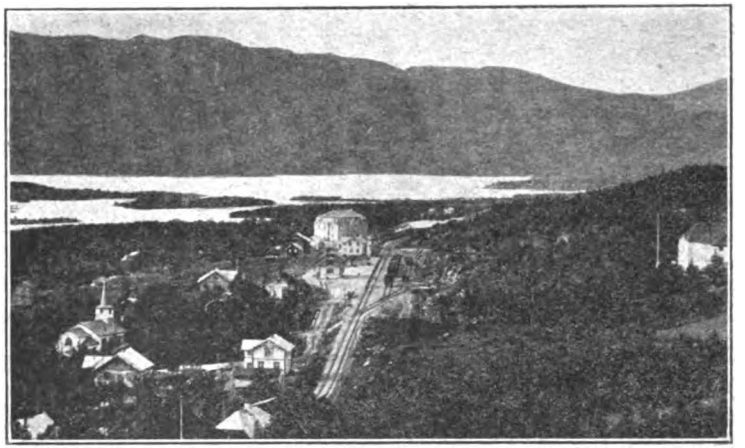
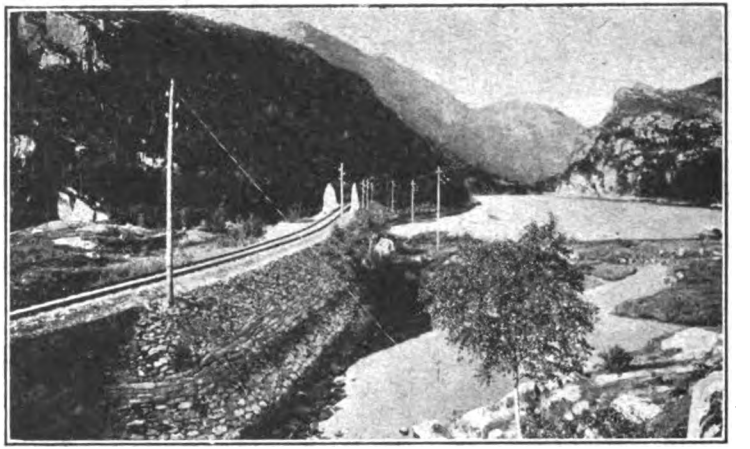
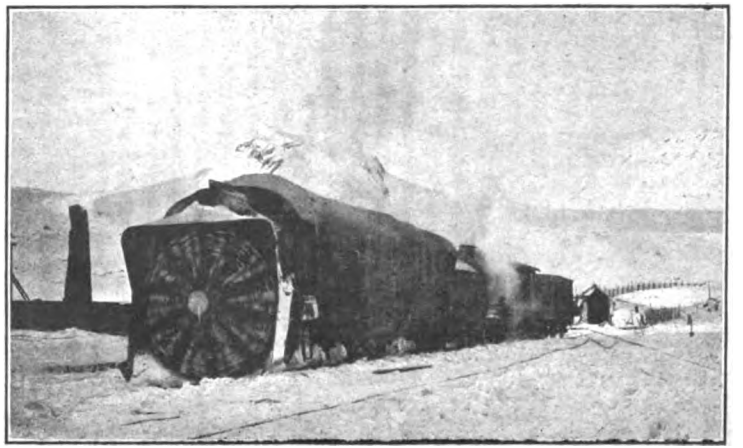


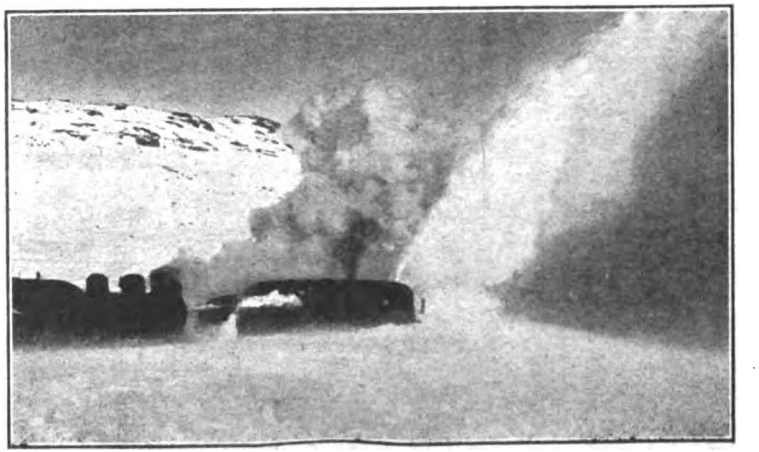
GJEILO: BERGEN-CHRISTIANIA RAILWAY.



ON THE BERGEN-CHRISTIANIA RAILWAY.



THE WHEEL OR SHOVEL OF THE ROTARY SNOW PLOUGH.



ROTARY SNOW PLOUGH AT WORK WHIRLING THE SNOW 60-80 FT. UPWARDS.

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tunnels. There are twenty-five of these, one of which—Gravehalsen—is over 17,000 ft. long. The boring of this tunnel took twelve years, and the train takes seven minutes to pass through it.

The mountain crossing may be said to begin at Voss, where the line begins to ascend. At Opset we are already above the tree line. The train then enters the Gravehalsen tunnel, at the other end of which lies the station of Myrdal, from which a zigzag road, in seventeen sections, runs down the Flaam Valley to the Sogne fjord. The Flaam Valley is one of the grandest in Norway, a wild ravine above whose sides mountains rise to a height of almost 6,000 ft. From Myrdal the train runs through several tunnels, and between these we catch glimpses of the most imposing and grandest scenery on the line. Down sheer precipices of 2,000 ft. we look into the Flaam Valley. A moment later another tunnel is entered, and on emerging another magnificent view is presented. Far below us, yet far above the valley, a glimpse can be had of the hotel at Vatnahalsen, occupying one of the most unique positions of any hotel in Europe.

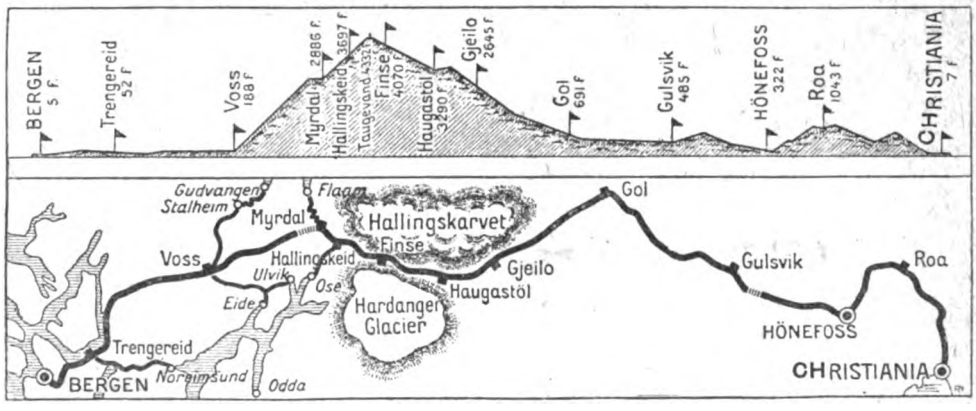
The scenery on the top of the tableland, as seen from the carriage window, is not remarkable for its bold outlines and sharp peaks, or for its distant views and dizzy precipices, but for its absolute wildness, and the contrast which it forms to the districts that are passed before and after.

This railway is notable as the only one of its kind in Europe which runs above the tree line, for it must be remembered that at this high latitude the snow-line is reached at a lower elevation than in countries further south. To find the same conditions in the Alps, it would be necessary to ascend to a height of almost 7,000 ft.

After passing Hallingskeid a first glimpse is had of the Hardanger-jökul or glacier, which is visible along a considerable portion of the line. Ever and anon a snow shed is traversed, built to keep the line clear of snow, while the miles of wooden snow fences appear strange to English travellers.

The highest point of the railway (4,332 ft.) is shortly before Finse is reached. Finse is the best ski-ing ground known, and the comfortable hotel here enjoys the distinction of being the most elevated hotel (4,200 ft.) in Northern Europe, being situated almost at the foot of the Hardanger glacier, to climb which is the endeavour of most of the visitors.

A hasty inspection of a map of Norway,




PROFILE MAP, BERGEN-CHRISTIANIA HIGHLAND RAILWAY

particularly one on a small scale, hardly indicates the importance of this line. Actually it possesses great value in that Bergen directly faces the Atlantic, while, even in normal times there is a considerable saving in distance and time by using Bergen as a principal means of entry to "old Norroway."

It is estimated that the construction of this line has altogether occupied about 30 years. In 1870 commercial interests were concerned with the establishment of a shorter route between the Atlantic coast and the Norwegian capital; but from the first it was realised that the work would be enormously difficult and expensive.

The first stage was a narrow gauge line from Bergen to Vossevangen, 67½ miles long. This was opened in 1883; but the great problem, the passing of the Hardanger range,

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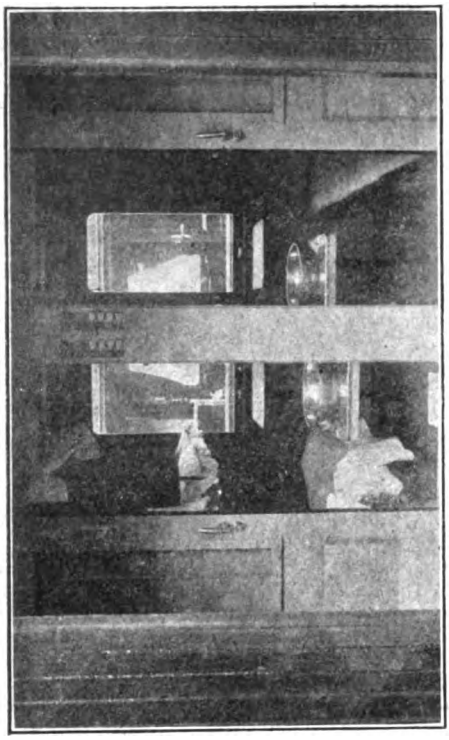
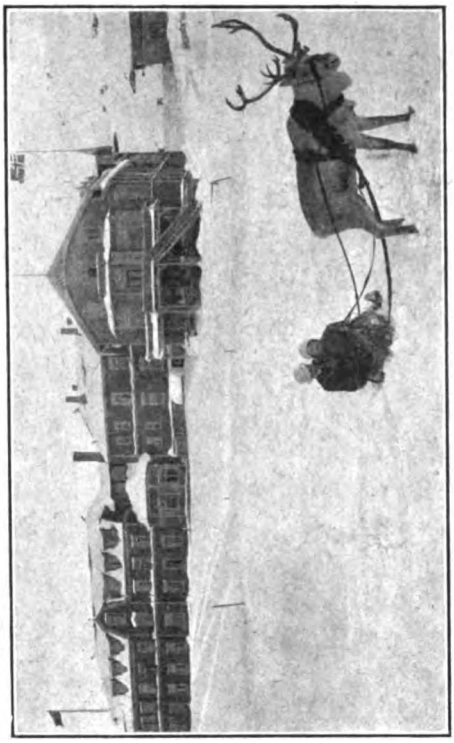
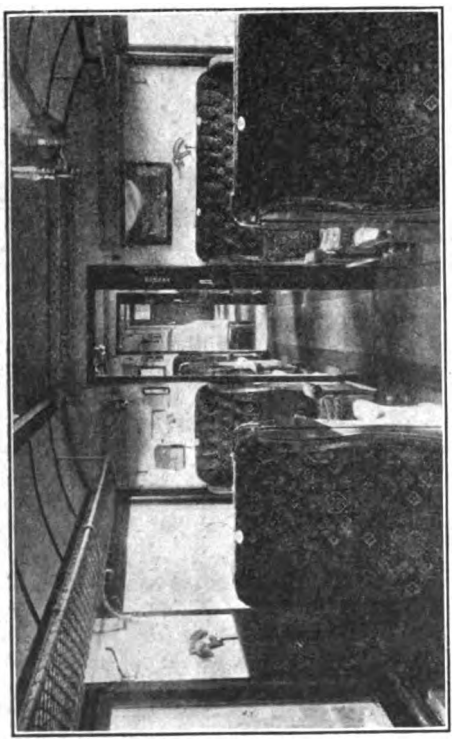


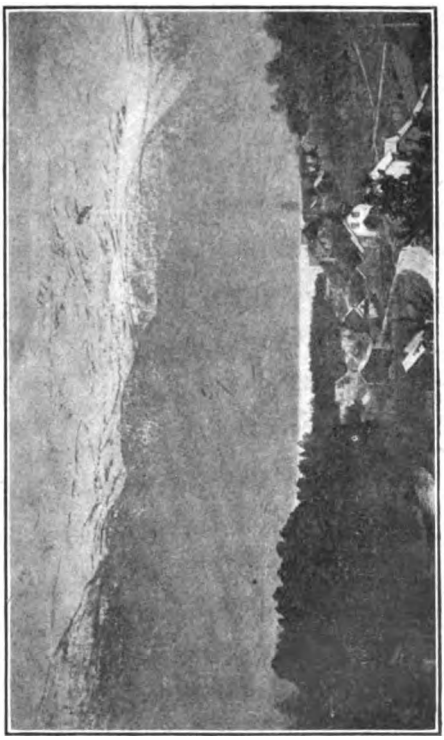
FOR SLEEPING THREE PASSENGERS. FOR DAY USE.
THIRD CLASS CORRIDOR STOCK.



FINSE HOTEL.



TOURIST CAR.



ON THE BERGEN-CHRISTIANIA RAILWAY.

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still remained unsolved. Apart from geographical difficulties, themselves most serious, excessive rain and snow falls had to be considered, besides the peculiar conditions necessarily associated with a northern winter.

No fewer than twelve alternative routes were surveyed before any further construction was undertaken; and eventually it had to be admitted that all offered many difficulties, and the only course was to adopt that which seemed to offer, as compared with others, the "least resistance."

MR. CHR. PLATOU,
General Director,
Norwegian State Railways.

As showing the nature of the difficulties to be surmounted, it may be mentioned that, as a result of special meteorological observations, it was found that at places snow was always liable to fall, even in the height of the summer, and general averages of 8–11 ft. of snow had to be allowed for, while exposed positions entailed frequent deep drifts.

The route adopted, *viâ* Gravehalsen, involved the piercing of the great tunnel of 17,240 ft., at an elevation of 2,818 ft.; but in other respects the work would be easier than by other routes. The section thus taken in hand extended from Vossevangen to Taugevand, 47 miles, involving an elevation of some 4,000 ft., in fact, to what is now the summit of the completed line.

On this stage there are twelve tunnels, aggregating 11¼ miles, including the great Gravehalsen tunnel. The latter is bored through tough granite, and as the face works were very exposed, and the work slow and difficult, it can be realised that the original contract price of £158,400 was not likely to be unduly remunerative to the contractors.

Difficulties arose, boring and blasting could only proceed slowly, the scene was remote from inhabited centres, the climate inhospitable to workers, whatever it may be to tourists; and there was little incentive for men to carry out the undertaking. There were, however, few unexpected difficulties, the rock proving homogeneous, with few faults, or hidden springs, though on one occasion an avalanche destroyed the power house and damaged much of the machinery and equipment.

However, the work was at last completed, and meanwhile progress had been made with the piercing of the Reinunga tunnel, 5,217 ft., the second longest on the section. Near here is a section of line built on a ledge of rock nearly 500 ft. above the road, and on this portion it is still necessary to guard against rock falls from the mountain side above.

Steps had by this time been taken for extending the line onwards, for until through connection was made the undertaking could possess little value. Beyond the summit the railway descends at relatively easy grades, and the work was not unduly difficult until east of Gulsvik—a little village on the northern bank of lake Kröderen. Another

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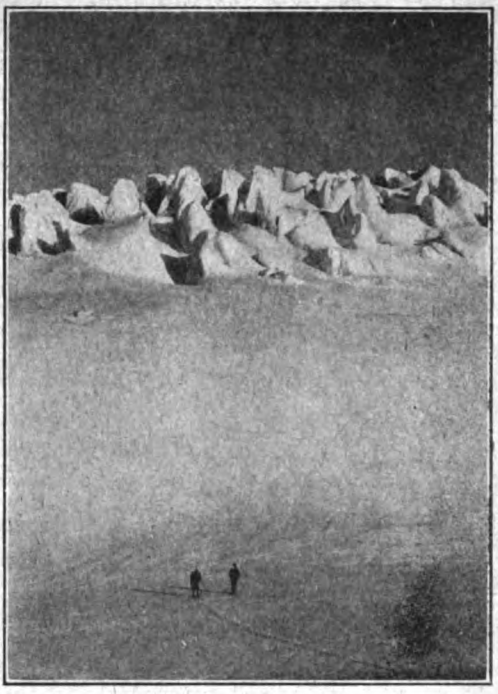
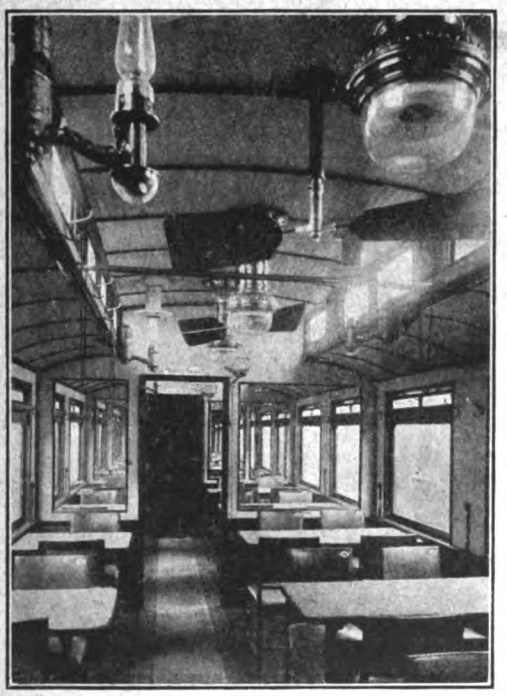
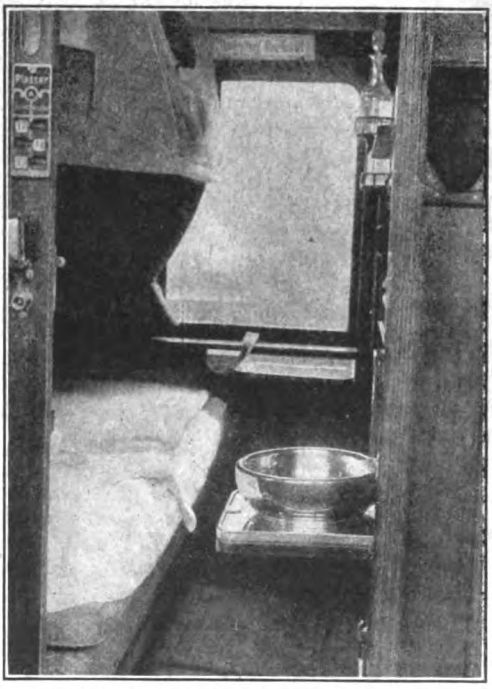
ON THE BERGEN-CHRISTIANIA RAILWAY.
Note timber snow shed at mouth of tunnel.



THE HARDANGER GLACIER (FINSE).



RESTAURANT CAR.



SECOND-CLASS SLEEPING COMPARTMENT, TWO PASSENGERS.
A first-class passenger has the exclusive use of the compartment.

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range of mountains entailed the construction of a tunnel 7,644 ft. in length, and this was, in its way, an even more difficult piece of work than the Gravehalsen tunnel had proved.

Beyond this tunnel there is another descent, until another ridge entails a heavy climb, followed by the descent to Roa, where connection is made with the eastern railway system of Norway.

While the later sections were in progress the original line from Bergen to Vossevangen was overhauled and converted to standard gauge. The 215 miles between Vossevangen and Roa were constructed in ten years, involving an expenditure of over £3,000,000.

Altogether this 307 miles of line includes no fewer than 184 tunnels, aggregating about 24 miles in length, 14 notable bridges, one of 566 ft. in length, and there are 55 stations or stopping places. It is estimated that 35,000,000 cubic ft. of rock had to be excavated, and that 1,800,000 lbs. of dynamite and blasting powder had to be employed. Before this line was available for use, about 54 hours were required to travel between the two chief cities of Norway, Bergen and Christiania. Now the distance is covered in from 12–14 hours, under conditions comparable in regard to travelling convenience and comfort to the train services which link London with Newcastle and other industrial and trading centres.

The public can hardly appreciate the difficulties to be overcome during the winter months in working a railway so situated. Ordinary snow ploughs as used in England are useless, and special rotary snow machines of 1,000 horse-power and costing £4,500 each, are in use. The engine of the machine is only concerned with propelling the great plough wheel which rotates with a velocity of 140 revolutions a minute, and often two or three locomotives have to be used to push this machine.

"READY FOR THE SPORTSMEN."

Until the fateful period of August, 1914, the tourist traffic to Norway was of considerable proportions and increasing; thus the traffic over this line had assumed quite an international character. At the present time tourists are few, but there is a heavy traffic in business people, and there can be no doubt that after the war Norway will attract an ever increasing number of English and French holiday folk.

The Norwegian State Railways have during the last few years been greatly improved, and the rolling stock is now essentially modern. A notable feature is the sleeping accommodation for third-class

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WATERFALL AND POWER WORKS.

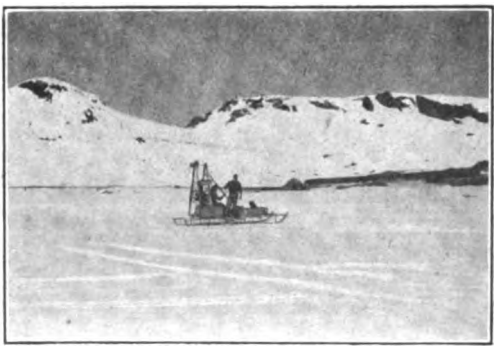
passengers, as well as first and second class. Restaurant cars are also attached to the trains, and potential visitors will find little to complain of in regard to comfortable railway travel in Norway. The present chief officer of the State Railways, Mr. Chr. Platou, is a strong and energetic administrator, quick to realise the best channel for development and to interpret the same with liberal broadmindedness. He has been especially sympathetic towards all sound proposals designed to attract visitors from the United Kingdom, and has the satisfaction of knowing that his judgment has not been at fault.

The mileage of State Railways equals about 1,950 English miles, and represents with the necessary equipment some £20,075,026 of capital. The revenue for 1910–1911 was £1,284,788 and the expenditure £965,964. For the year 1914–1915 the revenue was £1,950,731, an increase in five years of £665,943, whilst the expenditure was £1,627,825, inclusive of capital expenditure.

The number of passengers carried increased from 14,226,331 for the year 1910–1911 to 18,258,156: 1914–1915, and the merchandise tonnage from 4,926,528 to 5,730,780 during the same period, and the number of train miles run increased from 6,490,478 to 7,615,312. One other interesting record is kept by the administration, viz., carriage axle miles, and are represented by 167,163,938 during 1910–1911 and 213,076,797 for the business year 1914–1915.

A brief examination of the foregoing figures reveals a remarkable amount of energy and resource in railway construction and working upon the part of our 2½ million friends forming the population of this beautiful northern land.

The advent of a new fast steamer on the B. and N. service between Newcastle-on-Tyne and Bergen was mentioned in the article last October. This new vessel, the *Jupiter*, is now leaving Newcastle every Saturday, accomplishing the trip to Bergen in about 28 hours, as compared with about 33 hours previously. In view of this acceleration, it is anticipated that a further step will be necessary to consolidate the traffic value of this route—a steamer once a week that will accomplish the journey in about 20 hours, leaving Newcastle at midnight and arriving at Bergen at 7.0–8.0 p.m. It may be suggested that it will be well worth the serious attention of the Norwegian Government to consider contributing a subsidy to such a passenger steamer, as it would build up and hold a permanent passenger traffic over the 307 miles of State Railways from Bergen to Christiania described. The revenue from this traffic would, of course, be the smallest benefit derived by Norway compared with the business development which would follow.



SIR ERNEST SHACKLETON WITH HIS MOTOR SLEDGE AT FINSE.

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# British Locomotive Practice and Performance.

By CECIL J. ALLEN.

THE withdrawal of restaurant car facilities on certain leading railways, which came into operation on May 1st last, has been productive of a number of somewhat startling alterations to trains on the lines concerned. Opinions differ widely as to the necessity for so drastic a measure—speaking personally, as an habitualt raveller, I should have thought that it might have been possible to meet the case with at least something short of total abolition—but there is no doubt that the combinations of trains thus rendered possible will result in substantial economies in working, even though the passenger may find himself a good deal more crowded as regards accommodation than hitherto. Before turning to performance, it is well that we should look briefly into these train service modifications, which it was not possible to do last month owing to the late announcement of the alterations.

On the Great Northern Railway the more important changes are three in number in each direction. The up and down morning "Scotsmen," hitherto running in duplicate daily, now run as undivided trains throughout, loading normally to 11 or 12 bogie vehicles and to a maximum of 14 or so at week-ends. On the other hand, the 2.20 p.m. afternoon expresses in each direction have shrunk to an average of 42 to 46 axles apiece, and there is no longer the same difficulty in working them as was described last month in the case of the down train. Next we have the amalgamation of the 1.30 p.m. down Leeds express with the 1.40 p.m. to Harrogate and Ripon—an experiment that was tried some time ago, and with somewhat disastrous results as to time-keeping. But with the removal of the restaurant cars and the Post Office sorting van, together with a curtailment of the passenger accommodation, the combined load has been reduced to somewhat more manageable dimensions. In mid-week it usually amounts to ten eight-wheelers, partly vestibuled and partly modern non-corridor stock, together with a Gresley "twin" twelve-wheeler, totalling 46 axles. At week-ends this is increased by one or two further eight-wheelers, and time-keeping then becomes no easy task on the unaltered fast booking of this train. I have, however, had three very fair runs on this train since the modified working came into force, with 46, 50, and 54 axles respectively, but in view of the exclusive attention given to the Great Northern Railway last month, I must hold them over for a more suitable opportunity.

Of all the alterations made, the most remarkable is unquestionably the combination of the 5.30 Newcastle and 5.45 p.m. Leeds expresses out of King's Cross. It is the more surprising in that the latter had already absorbed the 6.5 p.m. from London to Hull, so that the new 5.30 p.m. is really three important expresses rolled into one. The new train averages in composition twelve 8-wheelers—six corridors for Newcastle, three corridors for Hull and three non-corridors for Leeds and Bradford. This obviously represents a very appreciable reduction in seating accommodation, as previously mentioned. The old 5.30 p.m. down Newcastle used to average nine or ten vehicles—38 to 42 axles—including the through Nottingham coach now withdrawn, and one third class and kitchen 12-wheeled coach. Similarly, the 5.45 p.m. to Leeds and Hull was normally a train of at least 11 corridor coaches, or 48 to 50 axles, one composite and one brake being for Doncaster (also now withdrawn), three 8-wheelers for Hull, and the remaining six, including two 12-wheeled dining cars—always well-filled throughout their journey—for Leeds. Even if we withdraw the three dining cars, and the Nottingham and Doncaster passenger coaches—in *lieu* of all of which passengers must find seating accommodation in other parts of the train—we have remaining a minimum of at least fourteen 8-wheelers, but this figure is still



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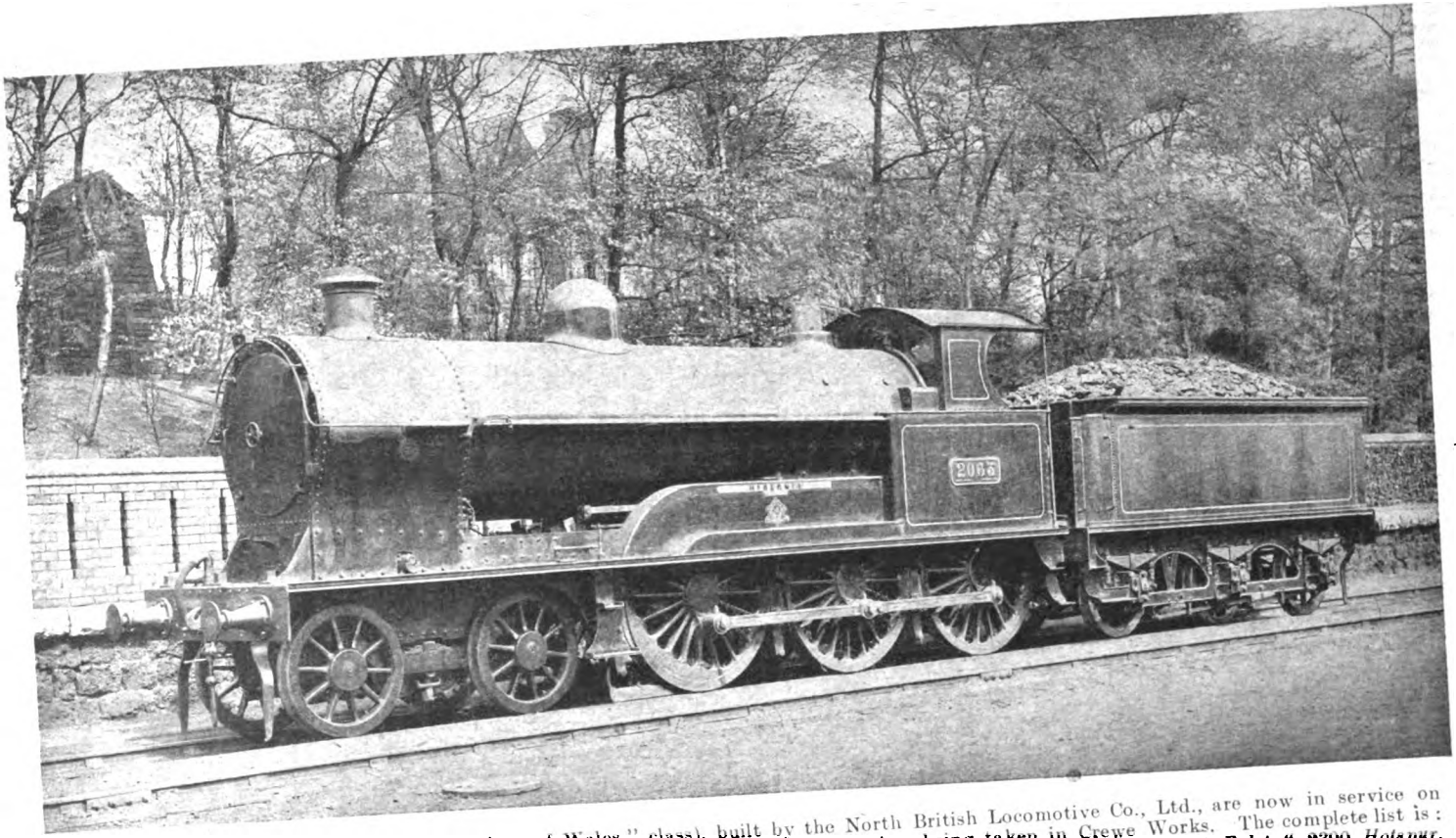


Twenty new 4-6-0 passenger engines ("Prince of Wales" class), built by the North British Locomotive Co., Ltd., are now in service on the London and North Western Railway. No. 2063 *Hibernia* is illustrated, the view being taken in Crewe Works. The complete list is: 136 *Minerva*, 173 *Livingstone*, 257 *Plynlimmon*, 446 *Pegasus*, 1749 *Precedent*, 2063 *Hibernia*, 2175 *Loadstone*, 2203 *Falstaff*, 2300 *Hotspur*, 2392 *Caliban*, 90 *Kestrel*, 401 *Zamiel*, 525 *Vulcan*, 610 *Albion*, 867 *Condor*, 1132 *Scott*, 1466 *Sphinx*, 1744 *Petrel*, 2055 *Milton*, 2339 *Samson*.

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further reduced by one coach each off the Newcastle and Doncaster portions respectively. This either bespeaks an exceedingly crowded train, or else the diversion of passengers to the Midland route; in the latter connection the 6 p.m. *ex*-St. Pancras, serving Leeds and Bradford, is certainly becoming a very well-patronized train, or has been so whenever I have seen it recently.

In the reverse direction the combination of the up day Scotch expresses has already been referred to. Beyond this the 8 a.m. from Newcastle to King's Cross stops at Doncaster, to attach the Hull train that previously followed it to London, and also at Peterborough, to make the Eastern Counties connection, in addition to the usual Grantham stop, and arrives at 1.45 p.m.—15 min. later. To the 10.15 a.m. from Leeds also there is added at Doncaster the 10.10 a.m. from Harrogate—the latter starting 25 min. earlier—and the combined train, calling at Grantham, in addition to Peterborough as heretofore, arrives at 2.15 p.m. This involves 20 min. increase in journey time from Leeds and 25 min. from Ripon and Harrogate. One cannot help thinking that, under these circumstances, it is a pity that both these heavy trains should require to call at Doncaster, Grantham and Peterborough in each instance, at an interval of only 30 min. apart. Had the opportunity been taken to start the Leeds express at 10 a.m. instead of 10.15 a.m., and the Harrogate train at 9.30 a.m., the departures from Doncaster and Grantham would have been 10.44 a.m. and 11.47 a.m., allowing of an arrival at Peterborough at 12.22 p.m., or in ample time to make the Eastern Counties connection, which is, I believe, rather an important one. This would allow of the combined Hull and Newcastle express running non-stop from Doncaster to London, leaving at 10.34 a.m., and arriving at 1.30 p.m., as previously, or certainly not later than 1.35 p.m., passengers for Grantham and Peterborough transferring at Doncaster into the Leeds train. In this way no facilities would be lost, as they have been, for example, by the abandonment of the Peterborough stop made by the old 5.45 p.m. down, or the Grantham and Retford stops on the original 1.40 p.m. down. Both the up Newcastle and Leeds expresses referred to are rather smartly timed up from Peterborough in 85 min., but so far as I have seen at present are keeping good time.

A few remarks in reference to the changes on the London and North Western Railway may also be made. The absorption by the 10.25 a.m. *ex*-Euston of the following North Wales express at 10.35 a.m. is a somewhat surprising development, as both were invariably very heavy trains. Even allowing for the removal of four restaurant cars—three from the first train and one from the second—a decided reduction of seating accommodation is involved in the fourteen or fifteen 8-wheelers to which the combined train now usually loads. The modification involves a stop at Stafford at 1.56 p.m. Manchester is reached 7 min. later than heretofore, at 2.19 p.m., and Liverpool at 2.30 p.m., as previously. An equally important change is the running of the 5.55 p.m. to Liverpool and the 6.5 p.m. to Manchester as one train, stopping at Crewe at 8.56 p.m. to divide. In the case of the 5.55 p.m. down the removal of dining facilities is a rather justifiable economy, as this train has hitherto enjoyed somewhat of the character of a travelling "club," from four to six heavy cars being used as seating accommodation throughout the journey, instead of a couple of cars, serving relays of meals. The Liverpool arrival time is now 9.50 p.m.—5 min. later—while the Manchester time is still 9.45 p.m., or as it was with a departure from London at 6.5 p.m. Further than this the 6.50 p.m. express to Birmingham now attaches the 7 p.m. train, slipping the latter at Blisworth, whence it proceeds to Northampton, and there takes up its ordinary working. The 6.50 p.m. itself calls at Willesden, leaving there at 7.2 p.m., and covers the 88½ miles thence to Coventry in 93 min., as did the old 9.20 a.m. *ex*-Euston. The final run of 19 miles from Coventry to Birmingham is achieved in 22 min., the time of 130 min. from Euston to Birmingham not having been increased, and this therefore becomes a very tightly-timed train.

In the up direction the 8.40 a.m. from Birmingham calls at Coventry in the standard time of 23 min. from the start (19 miles) and then also at Rugby, in order to allow of the withdrawal of the following 8.45 a.m. train. The 11⅜ miles from Coventry to Rugby are covered in 14 min., and the 82⅝ miles from Rugby to Euston in 91 min., the total journey time being increased to 2¼ hours. To the other up trains now calling at Coventry is added the 11.20 a.m. from Birmingham, which runs from Coventry to Euston in the standard time of 104 min. The train from Dudley and Walsall due in Euston at 2.25 p.m., ceases to run beyond

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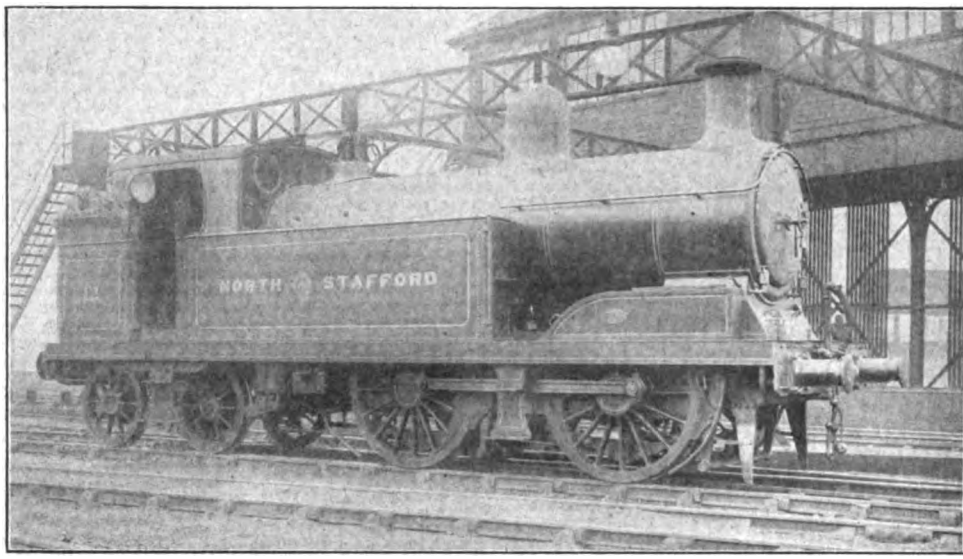
Rugby, through passengers being picked up there by the 11.40 a.m. from Stafford, which calls at Rugby at 12.39 p.m., leaves at 12.46 p.m., and reaches Willesden at 2.12 p.m.—10 min. later than before. Of all the up alterations, however, the most noteworthy is that of the 5.20 p.m. from Liverpool to Euston, consequent upon the withdrawal of the North Wales express due in Euston at 9.5 p.m., as from south of Stafford. The Liverpool train therefore calls at Stafford, and also at Blisworth, in order to give connection to Northampton, the 70¾ miles from Stafford to Blisworth being run in 80 min., and the 57⅜ miles thence to Willesden in the good time of 62 min. There still remain on the London and North Western Railway, therefore, a number of heavy and smartly-booked trains that are well worth watching from the timing standpoint.

There is no doubt whatever that the two lines principally concerned in the withdrawal of restaurant car facilities—the London and North Western and the Great Northern—have been the two that have suffered the most consistently for months past from the excessive loading of trains. With the "heavy express work" of the Great Northern Railway I dealt at length last month, and it is now fitting that I should follow on with some details of corresponding performance on the London and North Western Railway, where the average loads have been still heavier. A writer in the *London and North Western Railway Gazette* recently claimed in this respect that London and North Western locomotives are more hardly put to it—all the year round, and apart from "peak" summer loading—than those of any other British company, and from what I have noted during a good many years of constant travelling and observation I should be inclined to agree with him. He cites a recent year during which no less than 2,732 trains were dispatched from Euston with a tare load of 400 tons and over, 200 of which were of over 440 tons' weight, while there have been not a few special cases in which trains have been made up to a total weight of fully 550 tons, including passengers, luggage, staff and stores. Such runs as I have made on the London and North Western Railway during recent months, in addition to those of which correspondents have kindly furnished me with details, fully bear out these remarks. My own personal sequence of loading on eleven successive runs (on Manchester, Liverpool and Scotch trains) has been 395, 390, 440, 450, 400, 450, 470, 395, 275 (first portion), 460 and 380 tons (the last since the withdrawal of restaurant cars). Excepting the divided train, and the last one mentioned, this gives an average of over




*Photo]* [*P. F. Cooke.*

NORTH STAFFORDSHIRE RAILWAY.

0–4–4 tank engine, at London Road station, Manchester.

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425 tons per train, in every case unpiloted.

I have tabulated a series of six of these journeys, together with a further ten received from correspondents, four up and four down between Euston and Crewe, and eight in addition between Willesden and Rugby, the majority of which are up journeys In every case but No. 15, these runs were timed prior to the withdrawal of restaurant car facilities. Curiously enough, correspondents as a whole have furnished me with a good many more up logs on the London and North Western Railway than details of journeys in the opposite direction, this presumably resulting from the fact that the driver of an up express running behind time is more likely to attempt a curtailment of his schedule than one running on a punctually-started train in the opposite direction. These runs are

TABLE A. LONDON AND NORTH WESTERN RAILWAY. EUSTON-RUGBY-CREWE.

| Miles from London. | | 1 | 2 | 3 | 4 | Miles from Crewe | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Run No. .. | 1 | 2 | 3 | 4 | | 5 | 6 | 7 | 8 |
| | Engine No. .. | 2664 | 2513 | 2046 | 964 | | 104 | 365 | 2370 | 160 |
| | „ Name | *Queen Mary* | *Levens* | *Chas. N. Lawrence* | *Bret Harte* | | *Leamington Spa* | *Alchymist* | *Dovedale* | *King of Serbia* |
| | „ Type | †4-4-0S | ‡4-4-0S | §4-6-0S | ‖4-6-0S | | †4-4-0S | ‡4-4-0S | †4-4-0S | ‖4-6-0S |
| | Load (axles) | 52 | 56 | 61 | *a*62 | | 56 | 58 | 61 | 60 |
| | „ (tons e'pty) | 373 | 402 | 427 | *a*443 | | 394 | 407 | 422 | 434 |
| | „ (tons full) | 395 | 420 | 450 | *a*470 | | 420 | 435 | 460 | 465 |
| 0 | Euston .. | | M. S. 0.00 | M. S. 0.00 | M. S. 0.00 | 158 | | | M. S. — | |
| 5¾ | Willesden Jc. | | 10.50 | 11.35 | 10.40 | 152⅝ | | | — | |
| 11⅜ | Harrow .. | | 17.25 | 19.15 p.w.r. | 17.50 | 146⅝ | | | — | |
| 17½ | Watford .. | | 24.20 | 27.40 | 25.15 | 140½ | | | sigs. | |
| 24¼ | Boxmoor .. | | — | 36.10 | 33.15 | 133¼ | | | sigs. | |
| 31⅝ | Tring .. | | 39.20 | 45.10 | 42.15 | 126⅝ | | | 20.05 | |
| 36 | Cheddington .. | | — | 49.35 | 46.45 | 122 | | | 14.45 | |
| 40⅛ | Leighton .. | | — | 53.10 | 50.30 | 117⅞ | | | 10.15 | |
| 46⅝ | Bletchley .. | | 52.35 | 59.05 | 56.40 | 111⅜ | | | 55.30 | |
| 52⅜ | Wolverton .. | | — | 64.20 | 62.10 | 105⅝ | | | 49.25 | |
| 59¼ | Roade .. | | — | 72.05 | 70.20 | 98⅛ | | | 42.40 | |
| 62¼ | Blisworth .. | | — | 75.20 | 73.45 | 95¼ | | | 39.35 | |
| 69½ | Weedon .. | | — | 81.55 | 80.30 | 88½ | | | 33.05 | |
| 75¼ | Welton .. | | — | 87.35 | 86.40 | 82¾ | | | 28.00 | |
| 82⅛ | Rugby¶ .. | | 88.20 | 95.15 | 94.30 | 75⅞ | M. S. 85.38 sigs. | M. S. 81.50 | 18.50 | M. S. 84.57 sigs. |
| 91½ | Shilton .. | M. S. 12.00 | — | 105.30 | 105.30 | 66½ | 74.52 | 72.45 | 9.55 | 73.35 |
| 97 | Nuneaton .. | 17.30 | 104.20 | 111.25 | *a*111.45 | 61 | 67.43 p.w.r. | 66.18 | 74.10 | 67.01 |
| 102½ | Atherstone .. | 22.10 | — | 116.15 | 116.55 | 55½ | 60.50 | 60.50 | 67.55 | 61.27 |
| 110 | Tamworth .. | 28.55 | — | 123.05 | 124.25 | 48 | 53.12 | 53.14 | 58.10 sigs. | 53.22 |
| 116½ | Lichfield .. | 34.30 | — | 128.55 | 131.00 | 41¾ | 47.43 | 47.45 | 49.45 | 47.38 |
| 124½ | Rugeley .. | 42.20 | 131.20 sigs. | 137.00 | 140.15 | 33¾ | 40.02 | 39.59 | 41.45 | 39.52 |
| 129½ | Milford .. | 47.25 | 139.20 | 142.05 | 145.30 sigs. | 28½ | 34.48 | 34.57 | 36.25 | 34.44 |
| 133½ | Stafford¶ .. | 52.15 | 144.40 | 146.30 | 151.45 | 24½ | 29.58 | 29.57 | 31.05 | 29.42 |
| 138⅞ | Norton Bridge | 60.20 | — | 152.55 | — | 19⅛ | 25.16 | 25.19 | 26.05 | 25.02 |
| 147½ | Whitmore .. | 70.30 | — | 162.55 | — | 10¼ | 16.53 | 16.47 | 17.30 | 16.38 |
| 153¼ | Betley Road | 76.05 | 166.00 | 168.35 | — | 4¾ | 9.00 sigs. | 8.33 | 9.00 | 8.17 |
| 158 | Crewe .. | 82.05 | *171.25 | 174.10 | — | 0 | 0.00 | 0.00 | 0.00 | 0.00 |

Rugby-Willesden, see Table B. (cols 1, 5, 6, 8)

† "George the Fifth" class; ‡ re-built "Precursor" class; ‖ "Prince of Wales" class; § "Claughton" (4-cylinder) class; S Superheater engine; ¶ Service slack, 40 m.p.h. (for non-stop trains); * Passing time; p.w.r., permanent way relaying checks; sigs., signal checks; *a* Less 4 axles, 28 tons empty, 30 tons full, slipped at Nuneaton. Stops indicated by thick horizontal lines, all other times passing.

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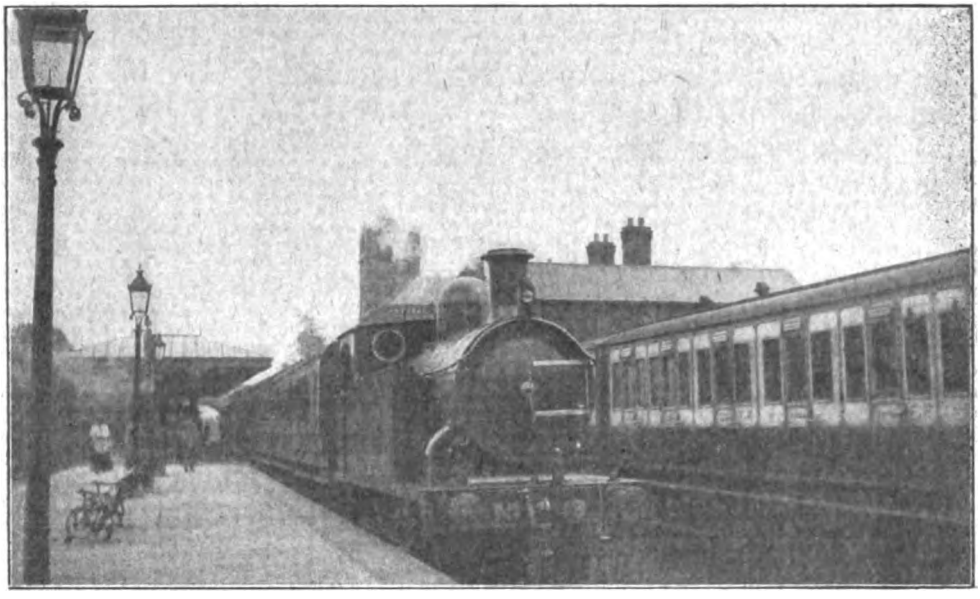
interesting in that they involve almost every express locomotive type on the London and North Western system, including the four-coupled "Precursors," superheated "Precursors" and "George the Fifth" class engines (there seems nothing to choose between the work of the two last-mentioned types), and the six-coupled "Prince of Wales" and "Claughton" types. The average load on these sixteen runs was 401 tons empty and 425 tons full, or 56¾ axles, but in only one case—when a "Precursor" was employed—was a pilot taken. Most noteworthy of all are the nine up runs from Rugby to Willesden, Nos. 9–17 inclusive in table B. Of these Nos. 9–11 were on a graded but by no means level—is a most creditable one with such tremendous trains, the average speed on these journeys thereby working out at all but 58 m.p.h. from start to stop.

Certain of the correspondents who favoured me with the logs set out herewith have unfortunately been very parsimonious with their details, so that in several cases I am precluded from adding much more by way of comment to the figures given in the tables, save in the case of my own journeys and those of a valued correspondent and careful observer whose runs appear in columns 5, 6, 8, 13, 14, 16, 19 and 20. This is particularly the case in run No. 2, which was made on



*Photo]* [*E. F. Hobbs.*

FURNESS RAILWAY.

Train in connection with Lake Side steamer at Ulverston. 0-6-2 tank engine No. 19.

schedule of 87 min., and an average of 5½ min. was gained per journey by "Precursor" engines with average loads of 415 tons; the next three were on 84 min. bookings—to stopping in the first case and passing in the other two—and the gains and loads with the "George the Fifth" class engines averaged all but 6 min. and again 415 tons respectively; Nos. 15 and 17 runs were made on a booking of 83 min., while No. 16 was on one of 84 min.: here, therefore, the "Prince of Wales" 4–6–0's gained an average of nearly 3 min. with over 440 tons. The general average time of almost exactly 80 min. for this journey of 77¼ miles—easily the 6 p.m. express from Euston to Liverpool prior to its deceleration. Such gaps in the times as Bletchley–Rugby, Nuneaton–Rugeley, and Stafford–Betley Road, are indeed tragic, and detract a great deal from the value of the record. First-class work, however, must have been performed, the average speeds of exactly 55 m.p.h. from Willesden up to Tring, and 62·5 from Tring to Rugby, being noteworthy achievements for a 4–4–0 engine under these circumstances. Consequently Rugby was passed in 88 min. 20 sec. from Euston—only 80 sec. over the "crack" Birmingham 2-hours booking—and with time now in hand, the driver evidently

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TABLE B. LONDON AND NORTH WESTERN RAILWAY, RUGBY-WILLESDEN.

| Miles from Rugby. | Run No. / Engine No. / Name / Type / Load (axles) / (tons empty) / (tons full) | 9 *1650 *Richard Trevethick* §4-4-0 56 385 405 | 10 1650 *Richard Trevethick* §4-4-0 56 385 405 | 11 1395 *Harbinger* §4-4-0 60 414 435 | 12 1631 *Racehorse* †4-4-0S 50 368 390 | 13 104 *Leamington Spa* †4-4-0S 56 394 420 | 14 365 *Alchymist* ‡4-4-0S 58 407 435 | 15 608 *Castor* ‖4-6-0S 52 358 380 | 16 160 *King of Serbia* ‖4-6-0S 60 434 465 | 17 1704 *Conqueror* ‖4-6-0S 64 450 480 | Miles from Willesden | 18 2664 *Queen Mary* †4-4-0S 52 373 395 | 19 2089 *Traveller* †4-4-0S 52 376 400 | 20 2495 *Basset-hound* †4-4-0S 52 376 400 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | M. S. | M. S. | M. S. | M. S. | M. S. | M. S. | M. S. | M. S. | M. S. | | M. S. | M. S. | M. S. |
| 0 | Rugby .. dep. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 77¼ | 88.45 | 82.52 | 84.05 |
| 7⅜ | Welton .. pass | 11.06 | 12.15 | 12.17 | 12.15 | 10.59 | 10.57 | 11.05 | 12.04 | 12.00 | 69⅝ | sigs. | 74.13 | 75.31 |
| 13¾ | Weedon .. „ | 16.06 | — | 17.43 | 17.25 | 16.01 | 15.57 | 16.15 | 17.11 | 17.25 | 64¼ | 68.50 | 68.22 | 70.13 |
| 19¾ | Blisworth .. „ | 22.16 | — | 24.20 | 23.40 | 22.09 | 22.14 | 23.00 | 23.29 | 24.10 | 57⅜ | 62.10 | 61.52 | 64.11 |
| 22¼ | Roade .. „ | 25.10 | 27.08 | 27.25 | 26.40 | 25.00 | 25.08 | 26.05 | 26.30 | 27.20 | 54⅜ | 58.35 | 58.42 | 61.14 |
| 30¼ | Wolverton .. „ | 31.44 | — | 34.21 | 33.15 | 31.32 | 31.49 sigs. | 32.50 sigs. | 33.15 | 34.15 | 47 | 50.25 | 51.10 | 53.58 |
| 36 | Bletchley .. „ | 37.07 | 39.47 | 40.18 | 38.40 | 37.00 | 37.39 | 39.45 | 38.45 | 40.05 | 41¼ | 45.15 | 46.01 | 48.05 p.w.r. |
| 42½ | Leighton .. „ | 43.32 | — | 47.35 | 45.10 | 43.25 | 44.31 | 47.55 | 45.29 | 46.40 | 34⅞ | 39.35 | 40.21 | 40.32 |
| 46⅝ | Cheddington „ | 47.40 | — | 52.26 | 49.15 | 47.34 | 48.55 | 52.10 | 49.55 | 51.05 | 30⅞ | 36.15 | 36.47 | 37.14 |
| 51 | Tring .. „ | 52.45 | 56.15 | 58.30 | 54.10 | 52.08 | 54.09 | 57.10 sigs. | 55.13 | 56.15 | 26¼ | 32.00 | 32.31 | 33.06 |
| 58⅛ | Boxmoor .. „ | 59.43 | 63.38 | 66.16 | 61.20 | 58.49 | 61.11 | 64.30 sigs. | 62.20 | 63.20 | 19⅛ | 23.30 | 24.13 | 24.53 |
| 65⅓ | Watford .. „ | 65.57 | 70.01 | 72.38 | 67.40 | 64.33 sigs. | 67.10 | 71.25 sigs. | 68.27 | 69.20 | 12⅛ | 15.55 | 16.28 | 17.10 |
| 71¼ | Harrow .. „ | 71.37 | 75.42 | 78.32 | 73.15 | 70.54 | 72.30 | 77.45 sigs. | 73.51 sigs. | 75.00 | 6 | 9.15 | 9.13 | 9.50 |
| 77¼ | Willesden Jc. arr. | 78.03 | 81.41 | 84.42 | 79.45 | ¶77.30 | ¶77.53 | 86.35 | ¶79.39 | 81.20 | 0 | 0.00 | 0.00 | 0.00 |
| | | MINS. | MINS. | MINS. | MINS. | MINS. | MINS. | MINS. | MINS. | MINS. | | MINS. | MINS. | MINS. |
| 43⅝ | Welton-Tring .. | 41⅛ | 44 | 46¼ | 41⅞ | 41⅓ | ††42⅜ | ††42⅞ | 43⅓ | 44¼ | — | — | — | — |
| 77¼ | Start-stop, Net times | 78 | 81¾ | 84¾ | 79¾ | 76¼ | 78¼ | 79½ | 80 | 81¼ | — | 82¼ | 82¾ | 81¼ |

* Piloted by 2-4-0, No. 1173; § "Precursor" class; † "George the Fifth" class; ‡ rebuilt "Precursor" class; ‖ "Prince of Wales" class; S Superheater engine; ¶ Passing times; net times calculated as to a stop at Willesden; †† net.

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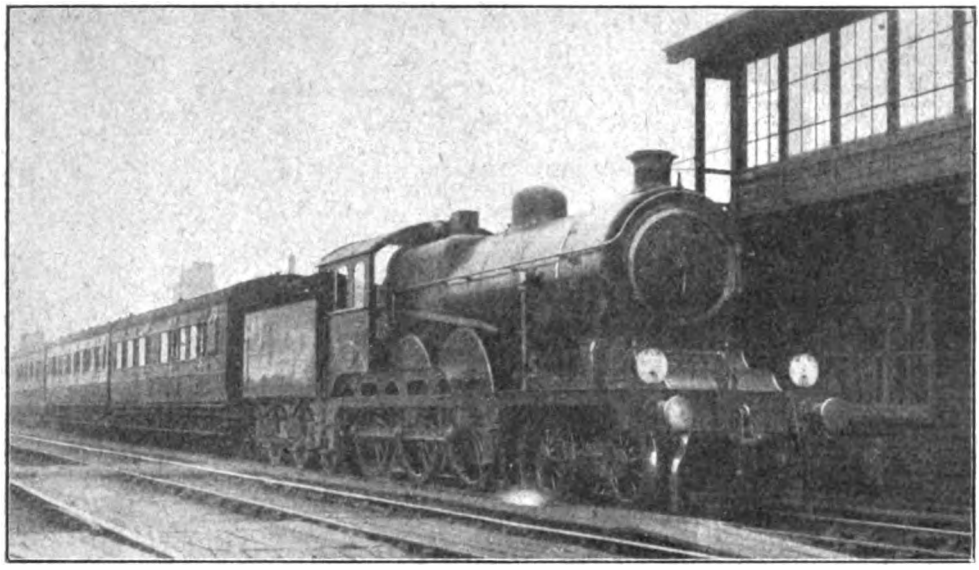

*Photo]* [*J. Macartney Robbins.*

GREAT EASTERN RAILWAY.

Down Norwich express at Cambridge. 4–6–0 superheater engine No. 1512.

took things a little more easily on to Rugeley. After this, however, a bad signal check intervened at Colwich, and elicited further efforts, as the Stafford–Crewe time of 26¾ min. is quite remarkable. But how could the observer, alas! have missed such a strategic point as Whitmore Summit? The remainder of the journey to Edge Hill, 34¼ miles, took 40 min. 50 sec., but this included a bad slack for adverse signals beyond Winsford, so that the net time from Euston to Edge Hill, 192¼ miles, was 207¼ min., and to passing Crewe, 158 miles, 168½ min. It is worthy of note that the engine hauling this train was one of the original "Precursors," now superheater-equipped, and its performance is practically indistinguishable from that of a "George the Fifth" type engine. It may also be mentioned, *apropos* of the restaurant car question, that four 12-wheeled cars were included in the train.

I have on a previous occasion briefly mentioned run No. 3, but take the present opportunity of reproducing it in detail. The train was the 10.30 a.m. *ex*-Euston, prior to deceleration or alteration, and, strange to say, this is the first run on a long-distance express south of Crewe that I have timed behind a "Claughton." The start was very sluggish, as we did not exceed 50 m.p.h. at Willesden, and fell to 42·9 at Harrow, while after the permanent way check beyond Pinner we only touched 50·5 m.p.h. at Watford, and fell finally to 46·4 at Tring. Thenceforward matters improved, and we gained 2 min. from Tring to Crewe, inclusive of signal checks beyond Betley Road. Speed rose to 69·2 m.p.h. at Leighton, 67 at Wolverton and 63·8 at Weedon; the minima at Roade and Kilsby were 50 and 55 m.p.h. respectively. The best work of the journey was performed between Rugby and Crewe, maxima of 70·3 m.p.h. being registered at Tamworth, 63·8 at Rugeley, and 72·5 at Betley Road, while the lowest rates, other than the carefully observed slacks at Rugby and Stafford, were 52·9 m.p.h. at Shilton, beyond Lichfield and at Whitmore. Net time did not exceed 172 min. from Euston to Crewe, which, although then a minute over schedule, would be 8 min. under the allowance in force up till May 1st last. After leaving Crewe, *Charles N. Lawrence* ran very smartly to Wilmslow, 18⅞ miles, in 20½ min. exactly, start-to-stop, but with a load reduced from 450 to 150 tons. No. 4 run was also made prior to the decelerations, with a truly appalling load—the "last straw," indeed, that "broke the camel's back," and resulted in a loss of 8¾ min. on the time then in force for the 5.30 p.m. *ex*-Euston. Allowing for the concluding check, however, the net time conforms exactly with the 150 min. now allowed this train. Of the two 4–6–0's,

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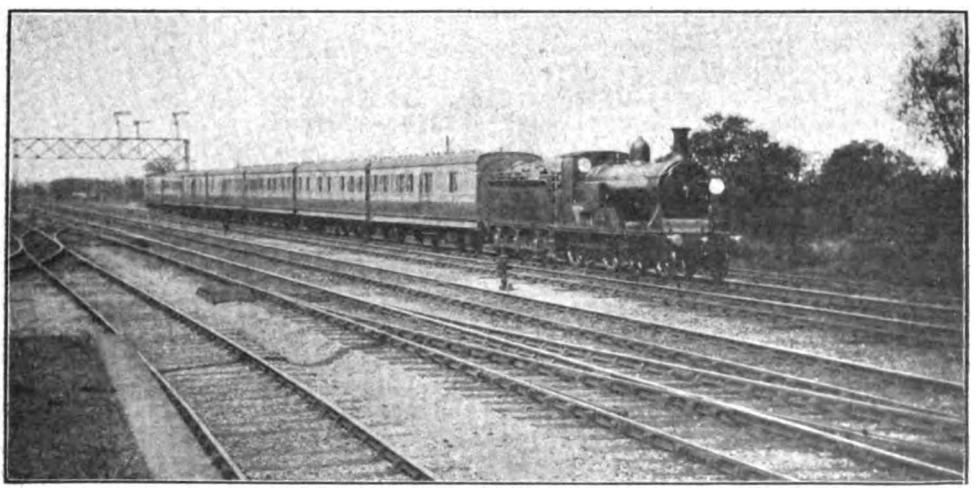
the smaller engine performed decidedly the better work on the ascent to Tring; in fact, these times out with so vast a train were very fair indeed, especially the initial time of 10 min. 40 sec. past Willesden. Here we were doing 52·9 m.p.h., and at Watford 54·2; the intermediate rate at Pinner was 45·9 and the final rate from Berkhamsted to Tring 46·9 m.p.h.—on continuous 1 in 341 and 330 ascents respectively. After that, however, we were unable to attain any substantial speeds on the easy lengths, not rising above 65·2 m.p.h., while at Nuneaton and Tamworth the most we could do was 64·3, and at Weedon 60·8. Minima were 47·9 m.p.h. at Roade, 49·5 at Kilsby Tunnel and 50 at Shilton. Under such running conditions this could not be described as a bad run, but I have known engines of this type perform better work, even under such onerous conditions, as will be seen in the second table.

No. 1 run, on the 10 a.m. *ex*-Euston, has not yet been mentioned, and is the second half of No. 18 in table B, into which I have put all the London–Rugby runs for comparison purposes. Signal delays south of Rugby put the driver on his mettle, and we started magnificently, Milford, 46⅝ miles from Rugby, being passed in 47 min. 25 sec. The highest speeds touched were 69·2 m.p.h. at Nuneaton, and 71·4 at Tamworth, and the time of 22½ min. for the 25¼ miles from Shilton to Lichfield was a particularly good one. Unfortunately the Trent Valley Junction slack at Stafford was rather too exemplary, while the recovery from it was slow; consequently we did not exceed 50 m.p.h. at Norton Bridge, and fell to 44·6 at Whitmore, although a top speed of 73·8 m.p.h. was attained on the descent to Crewe. Despite this comparatively leisurely finish, 2 min. were gained between Rugby and Crewe.

Of the up runs in table A, Nos 5, 6 and 8 were made on the 3.20 p.m. Scottish express from Crewe to Rugby, and their continuation to London will be found in columns 13, 14 and 16 of table B. The time allowed between Crewe and Rugby is one of 84 min. A first point of note in connection with these three runs is the extraordinary correspondence of the times between Whitmore and Tamworth, without any variation greater than 17 sec. at any point. This correspondence is still more marked in the case of runs 5 and 6 as between Whitmore and Atherstone, where the maximum variation drops to 9 sec.! *Alchymist*, after touching 45 m.p.h. at Betley Road, maintained 40 up the 3 miles of 177 to Madeley (following on 4½ miles at 1 in 330–250 from Crewe start), whereas *Leamington Spa*, which had lost a little time by a slight signal check on starting, made up the arrears with a sustained speed of 41·7 on Madeley bank. *King of Serbia* got away from the dead start more smartly, with a heavier load, but also maintained 40 m.p.h. on the rise. The maxima at Great Bridgeford varied from 69 to 71 m.p.h., despite the very gradual nature of the descent, and at Hademore



*Photo*] [*E. S. Hallett.*

LONDON AND SOUTH WESTERN RAILWAY.

Southampton-Waterloo train near Farnborough. Mixed-traffic 4-4-0 locomotive No. 414.

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troughs, between Lichfield and Tamworth, from 70 to 72, while the intervening minima (other than the Stafford service slack) at the 117½ mile-post varied from 59 to 61 m.p.h. Beyond Atherstone the times separate. *Leamington Spa* had a service slack before Nuneaton, although still contriving to breast Shilton Summit at 50 m.p.h.; *Alchymist*, without this hindrance, maintained 51, while *King of Serbia*, despite much easier running from Tamworth to Nuneaton, did not fall below 52. Beyond Brinklow *Leamington Spa* attained 68 m.p.h., but was checked by signal outside Rugby; the net time on this run was 81¾ min. for the 75⅜ miles. *Alchymist* had a clear run in, and with a maximum of 68 m.p.h. finished in 81 min. 50 sec. actual time. *King of Serbia*, after a maximum of 65 m.p.h., was also checked; the net time in this case was 83 min.

Lastly in this table we have run No. 7, which was made on a very bad day for travelling—Easter Tuesday—by the 4.7 p.m. from Crewe to Euston. The train was absolutely packed, and a generous overflow of passengers was disposed in the corridors throughout its length. In the early stages the running was not quite so good as that of runs 5, 6 and 8, as the rate up the 1 in 177 to Madeley was only 37·5 m.p.h., while we did not exceed 66·1 at Great Bridgeford. After Lichfield we had reached 67·1 m.p.h., when we were badly checked by signal at Hademore, and thereby lost fully 3 min. Consequently the net time from Crewe to Nuneaton was about 71 min., as booked. The work over the next section to Bletchley, where we stopped instead of slipping a coach, was exceedingly fine, the time for this 50⅜ miles, with a rising start to Shilton, a slack at Rugby, and a further rise to Kilsby, being only 55½ min. Needless to say, with such a load we lost on the impossibly tight allowance of 17 min. to Rugby, but from there we accelerated up the continuous 1 in 364 ascent to exactly 50 m.p.h. at Kilsby, and rose further to a sustained 69·2 m.p.h. at Weedon. The minimum speed at Roade was 54·2 m.p.h., and the maximum at Castlethorpe troughs 70·3. A superb start was made from Bletchley, the time of 20 min. 5 sec. from here to Tring Summit, very largely up at 1 in 330, being quite astonishing with a 4–4–0 engine and a load of 460 tons; the lowest speed on the final ascent was 48·4 m.p.h. Prolonged signal checks spoiled the finish of the run.

*Photo]* [*G. E. Ellis.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

Breakdown train proceeding to scene of accident.
Head signals on the locomotive are the same as for a Royal train.

I must now pass on rapidly to table B, and content myself with but brief comments on its details. The first three runs, 9, 10 and 11, were made on the up evening "Scotsman," in the days when the "Precursors" held the field, and are taken from a generous

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collection sent by a far correspondent in Canada. In only the first case was a pilot taken, and this was presumably an engine working "home." But good work was done, the speed on the gentle rise from Wolverton to Cheddington in particular being excellent, and as a result a modest total of 9 min. was gained on schedule. The next run, No. 10, lacks some important details, but sufficient of the "strategic" points were timed to show the great merit of the running, as the absence of a pilot, with an identical load—and a very heavy one at that—only made a difference of 3 min. 38 sec. all told. But the unpiloted engine was much smarter in stopping at Willesden. Run 11 represents about the maximum of a "Precursor's" capabilities, one would imagine, although even so *Harbinger* contrived to gain 2 min. 18 sec. from Rugby to Willesden. The booking of this train must certainly be confessed as an easy one, the working times from Rugby being split up as follows:—to Roade, 28 min.; Bletchley, 42 min.; Tring, 59 min.; Watford, 74 min.; and Willesden, 87 min. It will be noticed that the load told heavily on the engine from Cheddington up to Tring. Superheating has revolutionized the working and capabilities of these engines, as is proved by columns 12, 13 and 14, the superheater engines having an average of something like 5 min. in hand as compared with the unpiloted "Precursors" between Rugby and Willesden. *Racehorse*, in run 12, slipped rather badly at the start, and so did not make a brilliant time to Welton, but did splendidly thereafter, touching 71·4 m.p.h. at Weedon and 72·6 at Castlethorpe, while as far on as Bletchley we were still going at 62·5 an hour. The lowest rate at Roade was 57 m.p.h., and at Tring 51·7 (save for a momentary fall to 50 at the summit through premature notching up); after that, being well on time, we eased considerably, and never exceeded 67·1 down to Willesden.

My friend's run with *Leamington Spa*, No. 13 in the table, carries off all the honours, and is indeed phenomenal throughout. A speed of 48 m.p.h. was attained on the initial 1 in 364 rise to Kilsby, and, once through the tunnel, the train was never travelling at less than the mile-a-minute rate all the way to Cheddington. At Weedon the speed was 73 m.p.h., at Roade 62, and at Castlethorpe again 73, while the lowest rate at Tring Summit, after 5¾ miles rising continuously at 1 in 330, was 53 m.p.h. Consequently the astounding time of 52 min. 8 sec. was achieved from Rugby start to Tring with a 4–4–0 engine hauling a load of 420 tons. Even after Tring there was no slackening of effort, and on the falling grades to Watford speed rose to 77·5 m.p.h., the time of 5 min. 44 sec. for the 7 miles from Boxmoor to Watford being an unusual one with any load. "Even time" was attained between the two last-mentioned points, but signal delays supervened, and the total time from Rugby to Euston (this train does not call at Willesden) was 87 min. 17 sec. But, allowing for all delays, the net time was 82½ min., or 9½ min. under the booked allowance. *Alchymist*, the superheated "Precursor," tied closely with these times as far as Roade, accelerating to 49 m.p.h. at Kilsby, maintaining 72 at Weedon, and not falling below 61 at Roade, but the highest rate at Castlethorpe was 70 m.p.h., and a slight signal check before Bletchley combined to make the latter engine's times fall in arrears. At Tring premature notching up caused the speed to fall finally from 51 to 47 m.p.h., after which a top speed of 75 m.p.h. was touched before Watford, and a further one of 74 at Sudbury. Despite signal checks beyond Willesden, Euston was reached in 87 min. 11 sec. from Rugby, 84¼ min. net. The working times of this train from Rugby are:—26 min. to Roade, 40 to Bletchley, 58 to Tring, 72 to Watford and 84 to passing Willesden; the 6.33 p.m. up (column 12) is similarly timed, but has 1 min. less allowed between Bletchley and Tring, and 1 min. more from Watford to stopping at Willesden.

As regards the six-coupled engines, their work, even though in all cases good, pales before that of the four-coupled engines immediately preceding. *Castor*, on the 1.43 p.m. up, started well, attaining 50 m.p.h. on the ascent to Kilsby, but only touched 67·1 at Weedon, and 70·3 at Castlethorpe, and further fell to 55 at Roade. The signal check at Bletchley was a very severe one, although we recovered from it remarkably well, and sustained a minimum of 52·2 m.p.h. to Tring Summit. A string of signal checks spoiled the end of the run. An earlier achievement of *Castor* on the same journey, with only 320 tons, was to pass Whitmore in exactly 15 min. from Crewe, maintaining 47·9 m.p.h. on the 1 in 177, and to reach Stafford (stop) in 28¾ min. net, but the subsequent start-to-stop time of 58 min. 20 sec. from Stafford to Rugby with 380 tons was not so good. *King of Serbia* was decidedly slower than the four preceding

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runs on the ascent to Kilsby, not getting above 47 m.p.h., and his times all the way thence were very slightly more than those of *Alchymist* on every section except that on which the latter engine had a check. The maxima with the 4–6–0 engine were 71 m.p.h. at Weedon, 72 at Castlethorpe, and 74 at both Watford and Sudbury, while the minima were 57 at Roade and 49 at Tring. Euston was reached, despite delays beyond Wembley, in 88 min. 8 sec. gross, or 86¼ min. net, this train being again the up day "Scotsman."

No. 17 run is one which I have mentioned previously in these columns, and was made on the 1.43 p.m. up; it was timed by a Rugby correspondent, who, however, unfortunately omitted any details of the intermediate speeds. The load was the biggest of any in the whole series, but despite its vast dimensions a gain of 100 sec. on the smart schedule was registered. An interesting comparison may be made between runs 11 and 17, under similar conditions of working, both sets of times corresponding closely as far as Bletchley, after which the superheater 4–6–0 had decidedly the better of it. Speaking of comparisons, by the way, a still more interesting study is to compare these times from Rugby to Bletchley, 36 miles with a rising start and subsequent undulations, with the average Great Western starts from London to Reading, an exactly similar distance, but level throughout. On the basis of similar loads, these times in my experience compare very favourably with those of the Great Western Railway, despite the more moderate dimensions of the London and North Western engines, although the latter have doubtless to be worked harder in order to secure such results.

The down runs, Nos. 18, 19 and 20, may be dismissed in a few words. *Queen Mary*, originally using saturated steam, but now superheated, started exceedingly well from Willesden, touching the mile-a-minute rate at Watford, and not falling below 49 m.p.h. at Tring. Fast running was made thence to Bletchley, with a maximum of 72·6 m.p.h. at Leighton, but thenceforward we eased decidedly, the rate at Wolverton being only 66·1 m.p.h., and at Roade we had fallen to 44·5. Shortly beyond Weedon came the series of checks that resulted in a late arrival, though our net time was only 83¼ min. The starts in runs 1 and 2 were not so brisk, although good work was done beyond Watford, speed falling in each case from 58 m.p.h. at that point to 51 at Tring. *Traveller* touched 71 m.p.h. at Leighton, and after Wolverton began to overhaul *Queen Mary*, breasting Roade Summit at 53 m.p.h. and Kilsby at 52, while Weedon was passed at 68 m.p.h. So over a minute was gained to Rugby. *Bassethound* indulged in a great sprint at 76 m.p.h. past Leighton which was, however, cut short by a bad permanent way caution. The conclusion of this run to Rugby, however, was exceptionally fine, the time of 36 min. for the 36 miles from Bletchley involving a gain of 3 min. on schedule, and resulting in a punctual arrival. On a but little easier than level line from Bletchley speed rose to 70 m.p.h. at Wolverton, and it only fell to 56 on the ascent to Roade. Subsequently Weedon was passed at 72 m.p.h., and Kilsby Tunnel was entered at 55. With such first-class running the journey was completed in a net time of 81¼ min. for the 77¼ miles. My friend remarks in this connection: "I know of no type to touch the 4–4–0 for consistently rising to the occasion!" Certainly this is the case with the "George the Fifth" class engines on the London and North Western Railway, which, as these records show, has no rivals even among the larger 4–6–0 engines on its own line.

At this stage I must bring my remarks to a close, deferring further reference to the rail-joint method of timing, necessitated by certain letters from correspondents, until the next issue.

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# THE RAILWAY PORTRAIT GALLERY.

*Photo]* [*Elliott & Fry.*

## MR. ROBERT KILLIN.

**Superintendent of the Line, Caledonian Railway.**

THE Directors of the Caledonian Railway Company have appointed Mr. Robert Killin to be Superintendent of the Line, in succession to the late Mr. T. W. Pettigrew. Mr. Killin brings wide experience to aid him in the department of the service he has been called upon to supervise, and the confidence reposed in him by the Directors is reflected in their decision. His promotion is popular with the staff also, by whom he is held in high regard, and who are also, naturally, pleased that his "Commission" has been gained "from the ranks," Mr. Killin having passed through many grades of the service. Entering the employment of the Caledonian Railway in 1882, after a brief period in engineering work which served but to intensify an early acquired enthusiasm for railway matters, Mr. Killin served in turn in a signal-box, as parcels clerk, booking clerk, ticket inspector, and chief of "the flying squad." In 1897 Mr. Killin was sent to Carlisle, where his energy, ability, and conspicuous tact were of the greatest service to all the railways there concerned. It was at Carlisle that Mr. Killin may be said to have made his mark. In 1908 he went from Carlisle to be Assistant to the Western District Superintendent in Glasgow, a position he held until 1910, when he was appointed to the chief position of Western District Superintendent in Glasgow. In 1912 he received further promotion, being appointed Assistant Superintendent of the Line, a post which he has filled until the present time. No record of Mr. Killin's work would be complete that did not contain reference to his interest in railway ambulance work. He is justly proud of having been a member of the first Caledonian Railway team to gain Challenge Cup honours, and his enthusiasm has been greatly instrumental in fostering the ambulance movement.



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# Locomotive and Train Working in the latter part of the 19th Century.

## THE GREAT WESTERN RAILWAY (Standard Gauge). [No. V.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

(*Continued from page* 423, *June* RAILWAY MAGAZINE.)

GREAT ingenuity was employed on some of the locomotive workings to make the engines fit into the train service of the period under review, with the result that some engine turns included all sorts of miscellaneous duties. Here is one specimen of a night's work on the part of a Swindon goods engine. Leaving Swindon at 4:48 p.m. as leading engine of the heavy Hereford, Cheltenham and Swansea express, it came off at Stroud, where after a half-hour wait it picked up a long Aberdare coal train, which had left Swindon earlier in the afternoon. This coal train was duly deposited and left in Gloucester sidings at about 7 p.m. The next move saw the goods engine on a fast passenger train, the 9.15 p.m. from Gloucester to Newport, a curious train which consisted of only two six-wheeled coaches and a goods brake van, and made stops at Lydney and Chepstow only. From Newport the same goods brake van was taken light to Tydu, near Risca Junction on the Western Valleys section, and at about 2 a.m. a start was made on the return journey with a heavy coal train. This was a through run, and when we reached Swindon at any time from 6 to 8 a.m. we felt we had done a good night's work. There was no "relieving" of enginemen then, except under exceptional circumstances such as foggy weather. The spot known as Tydu—pronounced "Tidee"—has disappeared as such from the Great Western Railway working time-tables, for the name has been replaced by the much more imposing "Rogerstone Sidings." Welsh orthography on the railways has had to give place to a more comprehensible spelling, and the well known Maindu Junction signal box east of Newport is now labelled Maindee. This is on a par with the action of some Midland Railway iconoclast, who, a good many years ago, altered the signal box at the summit of the Settle and Carlisle line from Ais Ghyll to Aisgill, to the disgust of every right-minded Yorkshireman. One of these days the traveller may expect to see "Wooster" on the station name board of a celebrated cathedral city in the West Midlands. Some people in railway offices have so little soul for local sentiment!

A very large coal traffic is moved from Aberdare to London, and between Aberdare and Swindon—108 miles—the trains were almost without exception worked by double framed 0-6-0 saddle tank engines of the 1260 and 1581 classes stationed at Aberdare. It was extremely rare to see a tender engine on these South Wales coal trains, west of Swindon, though they were worked from there to London by tender engines. I mention this merely to draw attention to a feature in which the Great Western Railway locomotive practice differed from that of all other lines, *viz.*, the use of tank engines for long distance main line traffic. The tank engines employed for the Aberdare trains had no special features, and in spite of the long distance to be covered, their tank capacity was only 1040 gallons, and they were consequently frequently thirsting for a drink. They had 17 in. by 24 in. cylinders, 4 ft. 6 in. coupled wheels and 140 lbs. pressure.

I will make only brief mention of the train racing that took place at intervals between Gloucester and Standish Junction,



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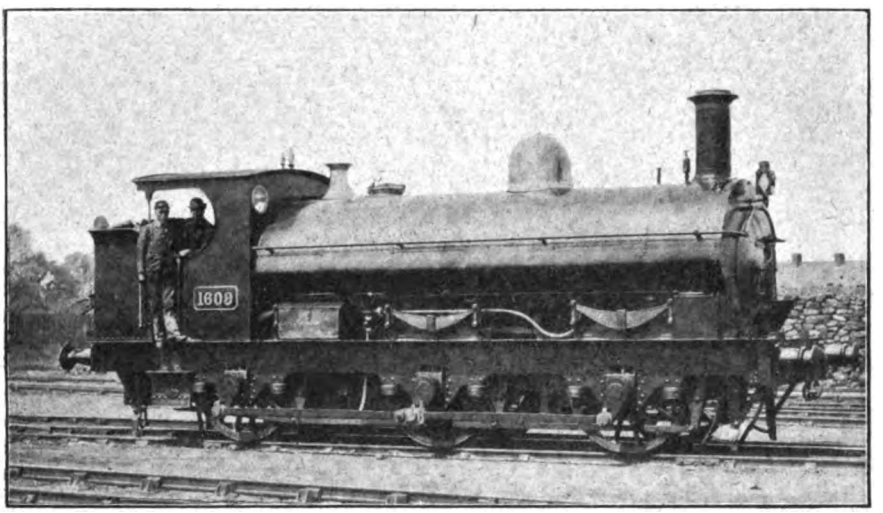
where the Great Western line from Gloucester to Swindon runs for some seven or eight miles exactly parallel to the Midland main line from Gloucester to Bristol. The races were very exciting at times, and generally speaking honours were fairly evenly divided. The Great Western Railway men used to say that the Midland engines had an advantage, for the latter ran on a transverse sleeper road, whereas the Great Western Railway piece in question was at that time laid entirely on the longitudinal "baulk" road, which was "dead," and not elastic to run over. The Gloucester drivers of the 7 ft. singles *Beaconsfield* and *Salisbury* were frequently much upset because two Midland 0-4-4 tank engines, 1280 and 1281, with




STANDARD 0-6-0 SADDLE TANK, AS USED FOR MAIN LINE COAL TRAINS IN THE PAST.
Wheels, 4 ft. 6 in.; cylinders, 17 in. by 24 in.

5 ft. 6 in. wheels, used to show them a clean pair of heels. These Midland engines worked a light local train from Gloucester to Lydney *vid* the Severn Bridge, and started out from Gloucester at about the same time as the New Milford up boat train left for London. But *Beaconsfield* and *Salisbury* occasionally took their revenge by beating a Bristol train on the down journey. Personally I had a good many "scraps" over this section, but must confess to catching a very bad Tartar one night on 2201 with the up South Wales-London mail, when, although we ran from Gloucester to Stroud, 12 miles, in 14 minutes, we were badly beaten by Midland engine 816 on a Bristol express. But this particular Midland engine was one of a celebrated class, which in their day were second to none in the whole country, and luckily for our reputation on the Great Western Railway there were none of them except 816 stationed by the Midland in the West—and this one was there only for a year or two.

Before leaving the Southern division and those districts under the immediate control of Swindon, I may perhaps mention peculiar uses to which, in stress of emergency, a locomotive can be put. There is a popular and mistaken notion that a locomotive is good for nothing except to pull trains. But it is a beast of burden that can adapt itself to other uses, *e.g.*, at one time a number of the shops in Swindon works were driven by old locomotives used as stationary engines, and I have known them to be used to drive air compressors for pneumatic rivetting on bridges. These, however, are well-known adaptations, but I think the following may be somewhat novel to many of the readers of the RAILWAY MAGAZINE.

In the year 1887 Her late Majesty Queen Victoria had a "Jubilee," and as the Great Western Railway is nothing if not exceedingly loyal, it was forthwith decided to commemorate the event in suitable fashion. The participation of Swindon took the form of a fête and tea in New Swindon park. Great as were the rejoicings, greater still was the quantity of tea to be provided for perhaps 15,000 people, and the locomotive department was called upon to solve the problem. Finally, after much cogitation, some genius, whose name ought to be

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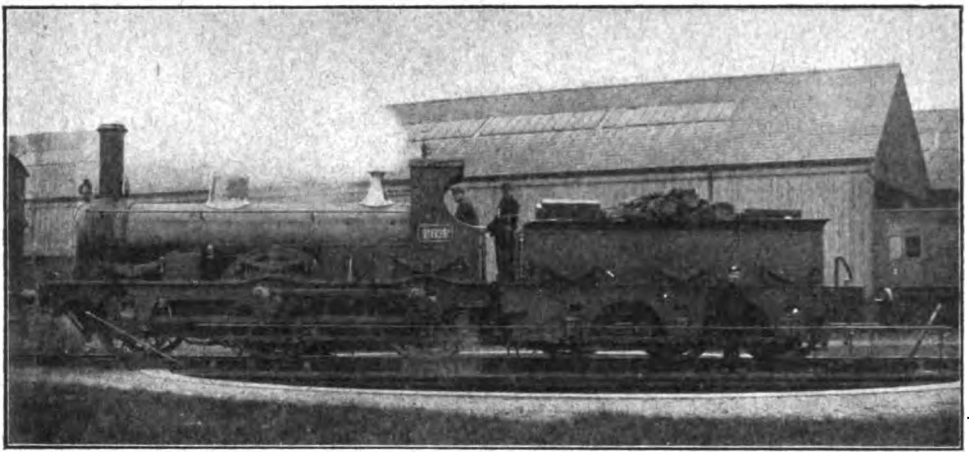

NO. 184, OXFORD, WORCESTER AND WOLVERHAMPTON RAILWAY LOCOMOTIVE (REBUILT).

Coupled wheels, 5ft. 9 in.; cylinders, 16 in. by 20 in.

immortalised with that of George Stephenson, suggested that the tea should be boiled in the tenders of a number of locomotives set apart for the purpose. I believe the original idea was to empty cases of tea into the tenders filled with cold water and then turn live steam from the engine loose into the mixture. The drawback was that the resultant tea might have left something to be desired as a cheering beverage, and moreover if someone had turned the wrong handle and started the injectors to work, the cones of the latter would have become blocked with tea leaves, so that the fête might have to be temporarily stopped whilst a new engine was being sent for. However, a modification of the original idea was actually adopted. There were a number of older tenders which were regularly used as water tanks, and travelled between Swindon and Kemble Junction, where the water was obtained. What the water was actually used for I do not at this moment remember, but the first thing to be done was to have the tenders cleaned out. They were in a pretty bad state too, for the man who got inside to do the job came out in about ten seconds with the remark that if tea was to be made in those tanks he would turn over a new leaf and drink beer for the rest of his natural existence. However, they were finally got into a fair state of internal order, so that the resulting beverage in the end had only a moderate "twang." Taps were fixed in the sides of the tenders and on the festive day three or four tenders were placed in the siding at Rodbourne Lane Crossing, the nearest point to the park, with a goods engine duly connected to them by means of a steam pipe. Steam was then blown into the tenders, one by one, and the revellers filled their tea urns from the taps. Never had Swindon imbibed so much tea in the course of its existence, and I am glad to be able to add that the doctors, in spite of the "twang," had no more cases than usual to deal with during the following week. The whole scheme was a veritable locomotive triumph for the cause of temperance—the man who cleaned the tenders alone excepted.

Returning to Maindu Junction, east of Newport, a very important line branches northwards from the South Wales main line and passes through Pontypool Road, Abergavenny and Hereford. This was originally the Newport, Abergavenny and Hereford Railway, afterwards merged into the West Midland, a line which became Great Western Railway property in 1863. When we arrive at Pontypool Road we have crossed the imaginary boundary which separates the Southern from the Northern division of the Great Western Railway, *i.e.*, in so far as the locomotive depôts were concerned, for Pontypool Road was under the immediate care of Wolverhampton and not of Swindon. From Hereford the West Midland division turns eastward to Worcester, where it joins the Oxford, Worcester and Wolverhampton Railway, which formed its original main line.

The single line tunnels through the Ledbury and Malvern hills seem to fit the trains like gloves, and as there was then no ventilating

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shaft in the former and only one in the latter, they used to be very uncomfortable places for the enginemen. This was especially the case if one train followed another at a very short interval before the fumes and smoke had properly cleared away. It was extremely bad for the men on the bank engines at the rear of goods trains, and I was almost suffocated on one or two occasions. Another similar delectable spot—but a shade worse if anything—was Quaker's Yard tunnel between Pontypool Road and Aberdare.

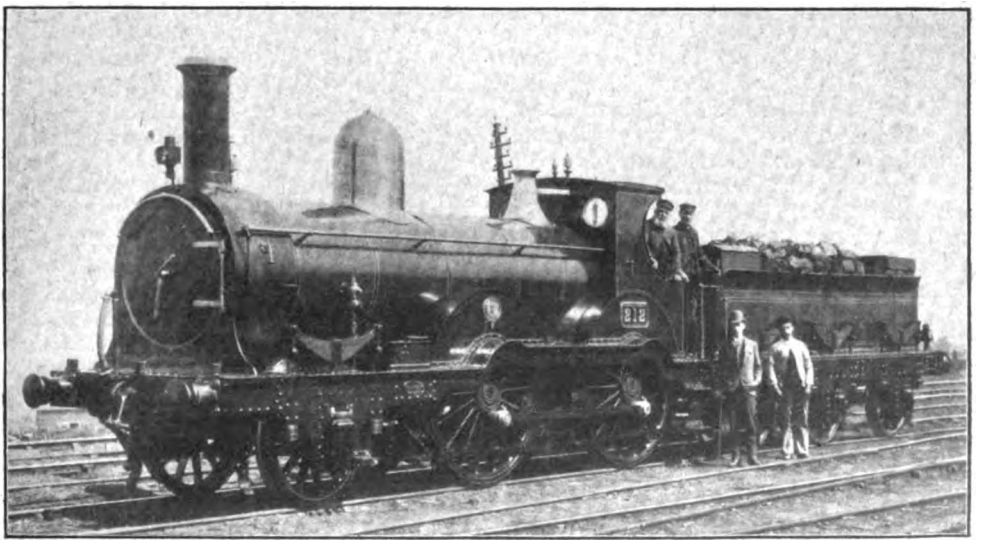
A characteristic of the section between Oxford and Worcester, at least as far as Honeybourne, was that at night it seemed the darkest section of line with which I am acquainted. The signals were at considerable distances, and judging from the total darkness across country, for not a glimmer would at times be visible, it appeared as if the countryside was absolutely uninhabited. But perhaps the natives retired early in this district.

The train services over the West Midland sections, as they used to be, can only be described as poor. In 1880 the best down train consisted of the Worcester portion of the 4.45 p.m. from Paddington, which left Oxford at 6.15 p.m. and arrived at Worcester at 7.45 p.m., with four stops in the 57 mile journey. In 1891 this train still remained as before, but two minutes had been taken off, and the arrival time at Worcester was 7.43 p.m. But there were then two other down trains, the 11.25 a.m. from Oxford, which was timed in 1 hour 27 min. with three stops, and the 3 p.m. with two stops, which, however, was also allowed 1 hour 27 min. Three similar up trains averaged 1 hour 30 min. to 1 hour 32 min. Eventually, about 1900, a real express was put on, the 1.40 p.m. from Paddington, which ran through to Worcester, 120 miles, without a stop, in 136 min. It was booked to pass Oxford in 70 min. from Paddington, an excellent performance. The old 4.45 p.m. was accelerated as between Paddington and Oxford by 4 min., and by leaving Oxford at 6.4 p.m. reached Worcester with the same four stops in 1 hour 31 min. The through non-stop up express, which was put on to correspond with the 1.40 p.m. down from London, left Worcester at 1.50 p.m. and reached Paddington without a stop in 142 min.

Of the engines which worked over the West Midland between Wolverhampton, Worcester and Oxford, the 7 ft. singles of the 999 and 157 classes at Wolverhampton and the "Sir Daniels" at Oxford have already been described.

Worcester had about a dozen of the original Oxford, Worcester and Wolverhampton Railway and Newport, Abergavenny and Hereford Railway* 2–4–0 engines

* These two railways had been merged into "The West Midland Railway," taken over by the Great Western in 1863.



ENGINE 212 (OF CLASS 196–201 AND 209–214), REBUILT AT WOLVERHAMPTON 1883.

Wheels, 6 ft. 0 in.; cylinder, 17 in by 24 in.

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—small double framed locomotives with 5 ft. 9 in. and 6 ft. wheels and 16 in. by 20 in. and 16 in. by 22 in. cylinders. They worked one early morning train to Didcot, several trains to Wolverhampton, and others to Hereford and Newport. But the greater number of trains were run between Wolverhampton, Worcester and Didcot by the 196–201 and 209–214 rebuilt "Beyer-Peacocks," with 6 ft. wheels, 17 in. by 24 in. cylinders, and 140 lbs. pressure. These had always been West Midland engines, but, after their rebuild in 1879–1883, very little indeed of the original engines remained. Three of them commenced their rebuilt career in 1879–1881 as 2–4–0 express tank engines, the first four-coupled express tanks in the country, but the all-tank engine idea on the Great Western Railway had only a short life, for passenger trains, and they were subsequently converted to tender engines.

Another service of trains over the West Midland was that from Birmingham to Cardiff *viâ* Stourbridge Junction and Worcester (Foregate Street). They were not particularly fast and do not require detailed mention. They were worked to Hereford either by the Birmingham 718 class, or the Hereford 372 class, both 6 ft. coupled engines of types to be mentioned again.

The Worcester goods engines for many years worked what were known as the Droitwich salt trains to London. Some of the old heavy salt wagons had six wheels, and there used to be a story that on one occasion between Didcot and Reading the middle axle of one of these wagons broke and gradually worked out at each side without derailing the wagon. The broken axle was only discovered by the driver of a following goods train, who noticed something scrape against his engine, and on reporting the matter the salt train was examined at Reading, with the result that an axle was found to be missing. I do not vouch for the truth of the above incident, and merely give it as it was told to me. I was never quite satisfied as to the manner in which the two halves could work out as described.

*(To be continued.)*

## OLD "SHARP" SINGLE ENGINES ON THE LONDON AND NORTH WESTERN RAILWAY.

IN the series of articles on London and North Western Railway train and locomotive working in the latter part of the 19th century, no mention was made of certain classes of engines which had almost finished their careers by 1876. Chief amongst these was a well-known class of "single" saddle tank passenger engines, and the present short note regarding these has been written (by Mr. Ahrons) in response to a request by some correspondents in regard to them.

As in the case of nearly all other railways, the London and North Western possessed a number of the well-known Sharp's single tender engines built between 1846 and 1854. Most of them had 5 ft. 6 in. driving wheels and 15 in. by 20 in. cylinders, though there were some with 5 ft. wheels. Of these, about half-a-dozen had been constructed originally for the southern division of the London and North Western Railway, which mostly finished their days about 1872–4 as tender engines. But three of the southern division engines, Nos. 653, 684 and 716, which had come from the South Staffordshire Railway, were converted by Mr. Ramsbottom to saddle tank engines. Most, however, of these engines had been the property of the Manchester and Birmingham line, the railway of which Mr. Ramsbottom had been Chief Locomotive Engineer at Longsight before he removed to Crewe in 1858. Of these engines built between 1846 and 1849 there were Nos. 402, 405, 406, 408, 409, 412, 413, 424 to 427, and also others which had come from the Manchester and Huddersfield and other lines, *e.g.*, 444 to 446, 468–9, 485 to 487. Finally there were two taken over in 1860 from the Birkenhead, Lancashire and Cheshire Junction Railway—Nos. 285 and 316. Nearly all these engines were rebuilt at Crewe as saddle tanks, and for a long time a large number of them worked local trains between Manchester (London Road), Stockport, and Alderley Edge, and also between Manchester and Wigan, etc. They were placed on the duplicate list, *i.e.*, numbered between 1800 and 2000 in 1873 and 1874, and many of their old numbers were taken by the 1874 5 ft. 6 in. "Precursors." They lasted two or three years longer, and were then rapidly broken up.

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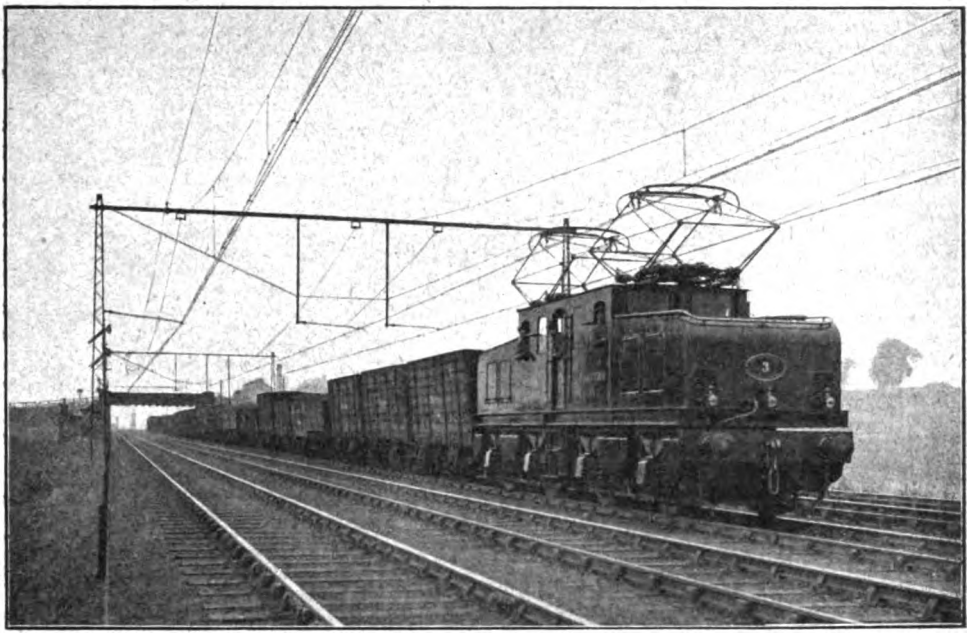

FREIGHT TRAIN HAULED BY ELECTRIC LOCOMOTIVE.

# A Notable Freight Traffic Electrification: North Eastern Railway.

## EQUIPMENT OF THE SHILDON-NEWPORT SECTION.

THE North Eastern Railway was one of the first in Great Britain to adopt electric traction, having as far back as 1904, when Sir George Gibb was General Manager, successfully applied electrical operation to the Newcastle and Tyneside suburban traffic, one of the earliest electric traction installations for other than underground lines and on a considerable scale. This railway now claims a pioneer reputation in respect of electric traction applied to heavy freight haulage, and on a system including many special electrical features.

In 1911 the General Manager, Sir A. Kaye Butterworth, instructed Messrs. Merz and McLellan, consulting electrical engineers, to report on the question of electrification with reference to the special conditions of the North Eastern system, and following the visit of the chief mechanical engineer, Mr. Vincent Raven, to the United States of America, in 1911 the Directors decided to proceed with a preliminary scheme, and electric working was started on July 1st, 1915, on the Shildon–Newport line, a limited service being run, as the overhead track equipment was not completed.

The Shildon–Newport route was selected for trial, this being an important freight line dealing almost exclusively with heavy mineral traffic. Some historical interest attaches to this selection, since the track runs over a portion of the original Stockton and Darlington Railway, the first public railway on which steam locomotives were used for conveying passengers and goods.* The fact that the first trial of heavy freight haulage on a large scale in England should be carried out on this particular route is noteworthy.

Beyond the usual considerations affecting the decision to apply electric traction to such a line, there was a special factor which

* This line was opened in 1825, and two of the original locomotives are now preserved in the Darlington station of the North Eastern Railway.



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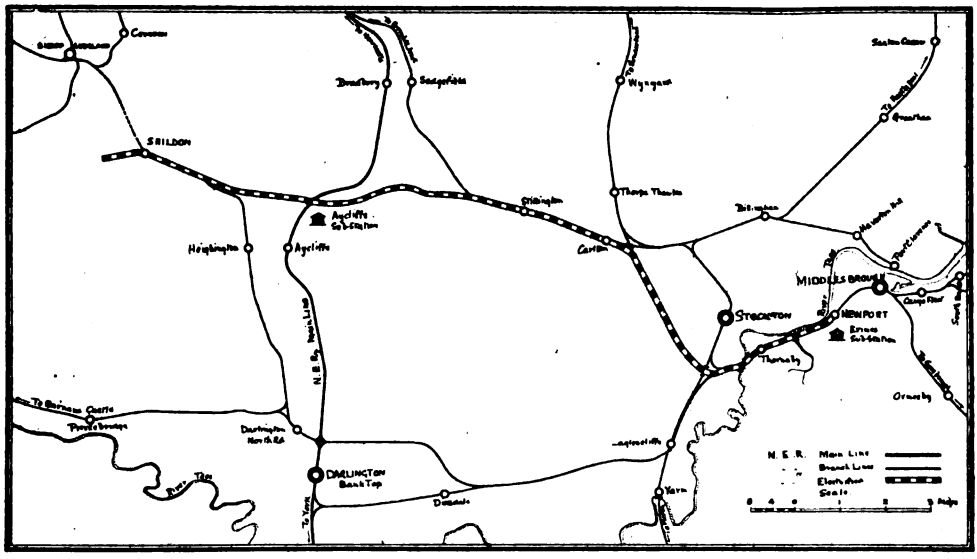
differentiated the North Eastern lines from others in the United Kingdom. As is well known, the production and distribution of electric power has been developed upon a larger scale along the north-east coast of England than in any other part of this country, and a large proportion of the power is derived from electric generating stations using as fuel the waste heat and gases derived from coke ovens and blast furnaces in the Durham and the Cleveland districts. An ample supply of cheap electrical energy was, therefore, available, and this fact, obviating as it does the necessity for a large capital expenditure by the railway on power-station plant, had an important bearing on the scheme.

the load consists mainly of empty wagons returned to Shildon Sidings.

It was decided to adopt the high-tension direct-current system, current being supplied to the locomotives through overhead contact wires at a pressure of 1,500 volts from the two rotary-converter sub-stations described later. Overhead track equipment was carried out under the supervision of the railway's then Chief Engineer, Mr. C. A. Harrison, and completed under the direction of his successor, Mr. C. F. Bengough.

The overhead contact wires on the main portions of the track consist of two hard drawn copper conductors, but on certain portions of the sidings, where the loads are not so heavy, a single contact wire only is




MAP SHOWING ELECTRIFIED LINES AND CONNECTIONS.

The electrified line under consideration has a route length of between 18 and 19 miles, and connects the mineral sidings at Shildon, which form one of the largest marshalling yards in Great Britain, with the Erimus Sidings at Newport, near Middlesbrough. Considerable portions of the sidings at both ends are also electrified, so that, including the sidings, about 50 miles of single track are equipped for electric working.

The general gradient is in favour of the laden traffic, the steepest being 1 in 103. This route carries the heavy mineral traffic from the south-west Durham coalfields to the Middlesbrough district, supplying the numerous blast furnaces and iron works concentrated there. In the opposite direction

used. The wires are supported by a solid steel auxiliary catenary wire, to which they are attached by sliding clips. This auxiliary catenary is in turn suspended from the main stranded steel catenary by means of steel wire droppers. The main steel catenary wire is supported from the steel structures by means of special insulators, double insulation being used throughout.

The normal span between the steel structures is 110 yards, but on curves and sidings they are placed at lesser intervals depending on the conditions existing. The normal height of the contact wire from rail level is 16 ft. 6 in., but at level crossings this is increased to 18 ft. 6 in., and under some of the low bridges, of which there are a large

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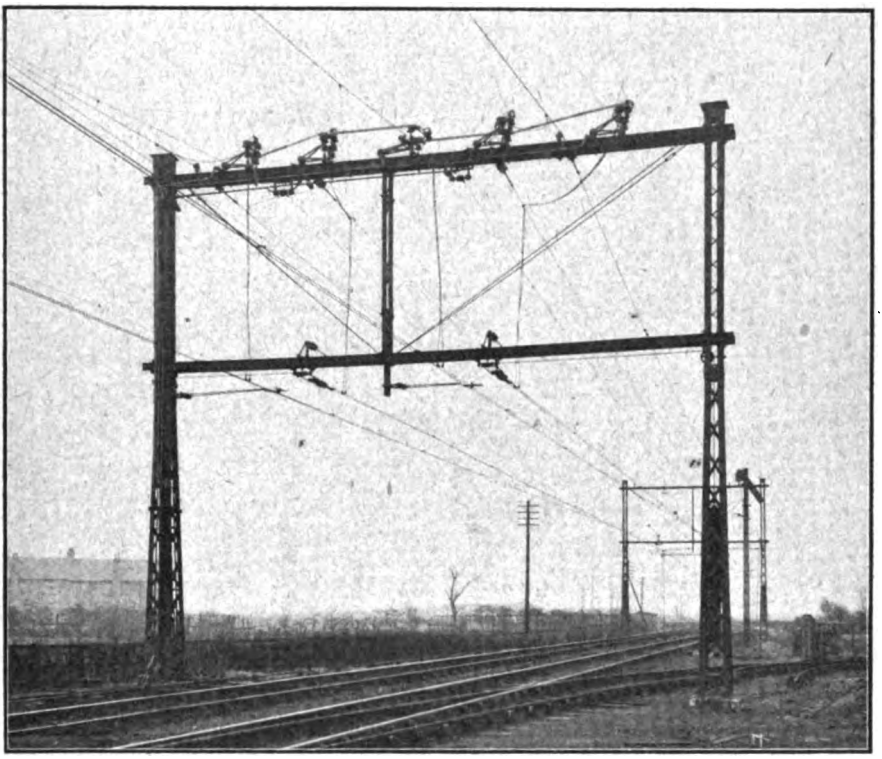
number on this route, the height from the rail level is reduced, the minimum height being about 13 ft. 8 in.

Each steel structure carries a pair of insulated steadying arms. These steadying arms are pivoted in all directions, and are attached to the contact wires by means of clips, their purpose being to fix the position of the contact wire relatively to the track. The contact wires are staggered in the usual way to prevent undue wearing of the bow collectors.

single contact wire is used over each track with ordinary tramway span wire construction. At marshalling and reception sidings, which are not equipped throughout and on which it is only necessary for the overhead construction to permit of the locomotives entering to pick up their load, the wires are terminated at a sufficient distance. Danger boards are fitted beyond which electric locomotives should not pass, but if by any chance they should over-run these, the terminal construction is such that no damage



OVERHEAD STRUCTURE WITH SECTION SWITCHES. SHOWING ALSO POSITIONING ARMS FOR OVERHEAD WIRE.

The general type of steel structure carrying the wires consists of two steel masts and a cross girder, each of these being made up of two channels with flat steel bracing. On curves a centre strut, steadied by steel tie rods, is added. In some instances cantilever construction is adopted.

In order to limit as far as possible the sag of the contact wires due to temperature variation, automatic tensioning is adopted. The tensioning points are approximately 1,100 yards apart. On some of the sidings where only shunting work is done and the loads on the locomotives are not heavy, a

would be done to the bow collectors or to the overhead track.

When passing under low stone bridges, of which there are a large number on the route, it is in some cases possible to carry the main catenary wire through the bridge, but at most of them it is necessary to anchor it off to the bridge. In these cases, in order to obtain the necessary clearance, the contact wires, together with the auxiliary catenary, are brought towards the centre of the bridge, so that contact is made towards the extreme edge of the bow collector. In order to prevent the other edge of the bow collector

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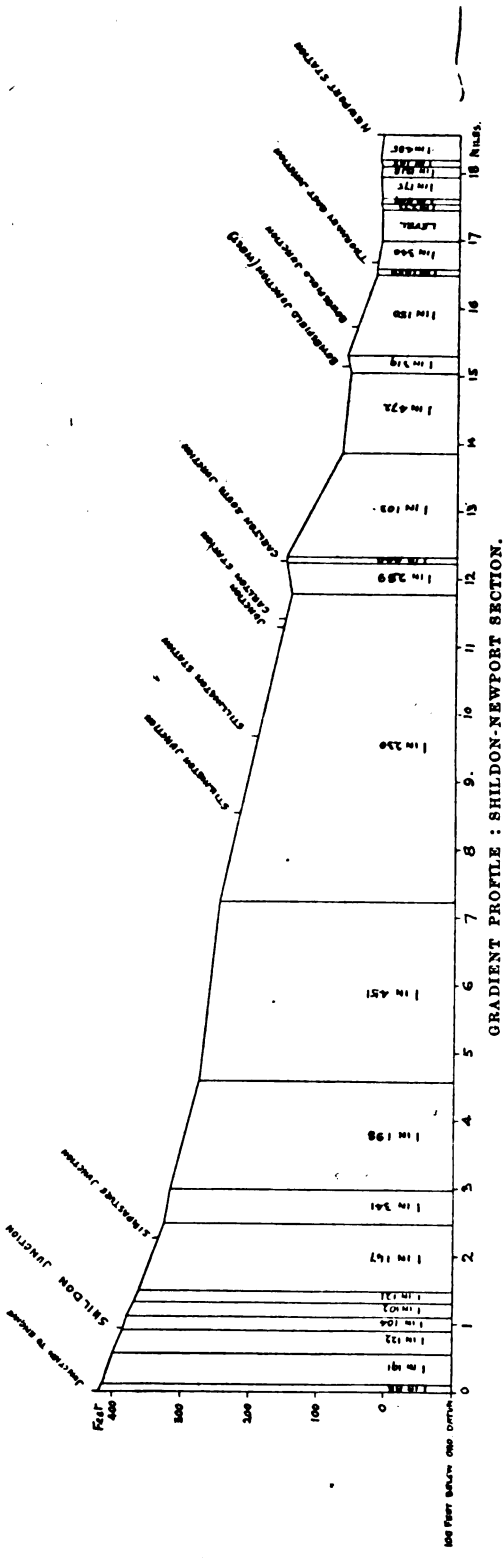


from striking the bridge a guard wire is fitted. This guard wire is anchored off to the structures on either side of the bridge, and is only alive while a locomotive is passing underneath.

Section switches are erected as necessary, and one illustration shows a series of five fitted on a girder.

As the train control system of working is in use on this route, the signal cabins are connected by telephone with a central control office situated at Newport, and the handling of these switches is directed from the same point.

There are two sub-stations, supplied with three-phase current from the interconnected mains system of the North East Coast Power Companies through the Cleveland and Durham Electric Power Company. Aycliffe is supplied at a pressure of 20,000 volts between phases through two overhead lines. The Erimus sub-station is supplied at a pressure of 11,000 volts between phases through underground cables connected to the power company's system in the Middlesbrough district, the alternating current switchgear being of the same type as that of Aycliffe.

A special feature of the transmission scheme is the high voltage D.C. gear. This switchgear has been designed somewhat on the lines of that usually adopted for high tension A.C. boards; that is to say, the apparatus is of the remote controlled type, and is mounted in cell structures built up of brick walls with moulded stone division slabs, each equipment being thus entirely separated from its neighbour.

The individual cells are built up on the cubicle system, that is to say, special compartments are provided for:—

(1) Busbars and isolating switches (top cubicle).
(2) Circuit breakers (intermediate cubicle).
(3) The bottom cubicle contains the operating mechanism for the isolating switches and circuit breakers, also the connecting cables passing up to the circuit breaker units.

The locomotives were designed and built at the North Eastern Railway works at Darlington, under the supervision of the Chief Mechanical Engineer, Mr. Vincent L. Raven, the electrical equipment being supplied and fitted by electrical firms. They are designed to haul trains weighing 1,400 tons at a speed of not less than 25 miles per hour on the level.

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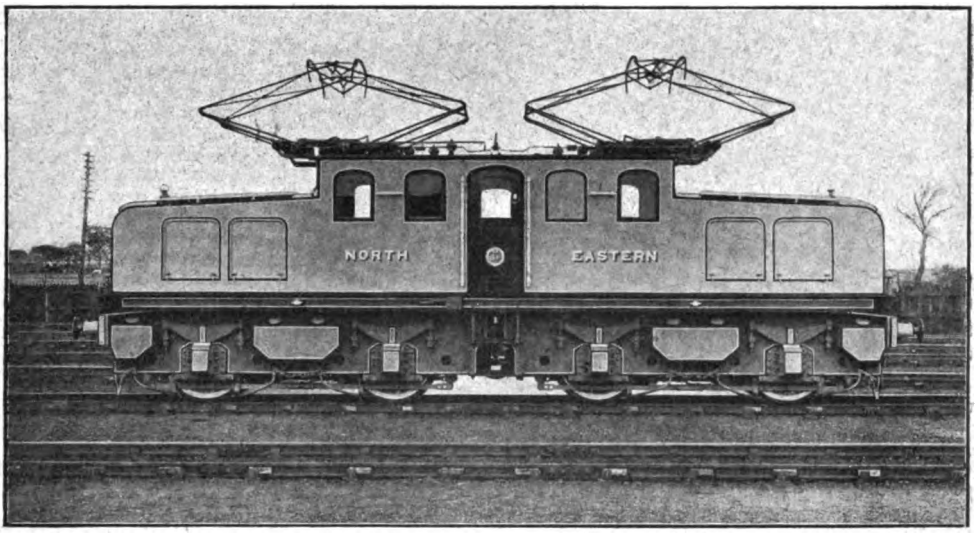
The engine has two motor trucks. The trucks are connected by means of a buffer coupling and arranged for lateral movement with vertical rigidity. The sloping ends are partitioned off from the cab and contain the resistances, contactors, motor cut-out switches, multiple cut-out switches, and all high-tension electrical apparatus. Entrance to each sloping end can be obtained through doors which are normally locked.

The bow collectors on the roof of the cab are raised and maintained in connection with the contact wire by compressed air. A cock is fitted on the air system, the removable handle of which forms the key of the doors mentioned. This handle is so arranged that it can only be removed when the cock is in the exhaust position, so that it is impossible to open the doors of the sloping ends while the bows are in contact with the overhead wires.

In the cab two master controllers are fitted, one at each end. The cab also contains all auxiliary switches for controlling the air compressor and the two dynamotors described later, and for lighting and heating, together with the control valves for the Westinghouse brake and for air sanding. In the centre of the cab there is a vertical hand wheel for the hand brake. The dynamotors are securely fixed to the floor, the switches, etc., being fixed on the sides of the cab and weather boards.

The motor equipment of each locomotive consists of four totally enclosed motors, each driving an axle through single reduction twin gearing. The motors are suspended by means of a cross beam suspension bar with bearings and re-action springs. These with the motor suspension bearings on the axle, provide the motors with four points of suspension.

The four main motors are fitted two in each bogie, and are each wound for 750 volts, the pair of motors in each bogie being connected permanently in series. The four main motors of each locomotive thus form two units which are controlled on the usual series parallel system. Each motor is capable of developing 275 brake horse power at a speed of 20 miles for one hour with forced ventilation. The motors and gearing are designed so as to run at a speed of 45 miles per hour without exceeding the limits of safety, but the normal speed on the level when hauling a train of 1,400 tons is 25 miles per hour.




ONE OF THE NEW ELECTRIC LOCOMOTIVES.

Each locomotive is capable of performing four round trips in twelve hours, each consisting of a trip from Shildon to Newport with a train of 1,400 tons, followed by a trip from Newport to Shildon with a train of 800 tons, the distance of each trip being about 18 miles. The locomotives are able to start a train of 800 tons from rest on a grade of 1 in 100 and accelerate to normal running speed.

A motor-driven air compressor is fitted in the cab of each locomotive for supplying air for the Westinghouse brake equipment, air sanding, raising the bow collectors, and

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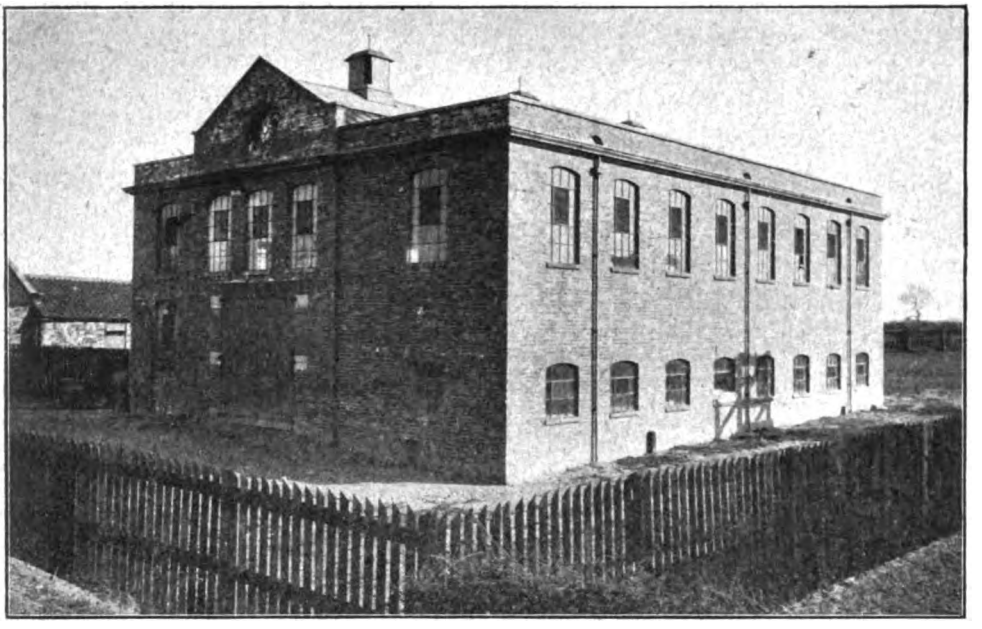
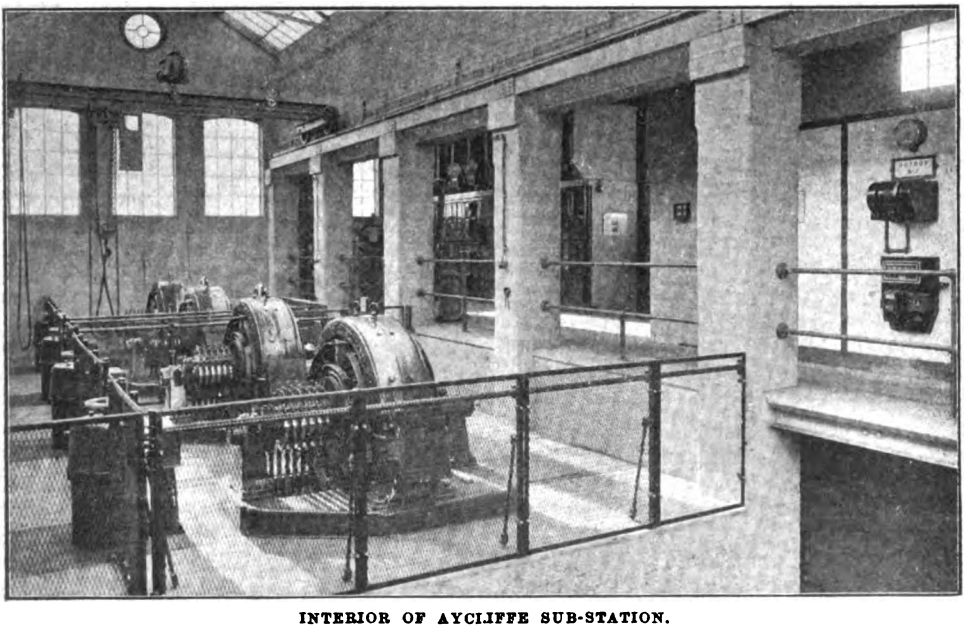


AYCLIFFE SUB-STATION.

for air whistles. An automatic governor is provided for the compressor, and is so arranged that the motor circuit is opened when the air pressure rises to 100 lb. per sq. in., and closes again when the pressure falls to 80 lb. per sq. in.

A hand pump is provided by means of which the bows are raised at the commencement of the day's working if no pressure is available in the reservoir. By means of the control cocks in the cab, either one or both of the bows can be raised or lowered. Each pantograph is raised and maintained in contact with the overhead wire by means of an air cylinder, so that in the event of a failure of the air pressure, the bows are



INTERIOR OF AYCLIFFE SUB-STATION.

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automatically lowered. The air cylinders raise the pantographs through springs which maintain an even pressure against the contact wire notwithstanding variations in its height.

An existing engine shed at Shildon was adapted for the use of these locomotives, a sufficient portion being electrically equipped for the purpose. An automatic circuit breaker is provided controlling the whole of the shed equipment, and each engine stall is controlled by an independent isolating and earthing switch so that work can be safely carried out on the roof of any locomotive without interfering with the operation of locomotives in adjacent stalls.

Tests have been carried out recently with one of the electric locomotives. Several journeys were made between Shildon and Newport, a train of 1,400 tons of laden wagons being taken down from Shildon to Newport, and a train of 800 tons consisting of ninety-two empty wagons hauled from Newport up to Shildon with stops on certain of the heaviest grades. The 800-ton train was stopped and started on a grade of 1 in 103. The maximum drawbar pull during the tests reached 16 tons, the average speed on the run up from Newport to Shildon being 18·3 miles per hour, the maximum speed being 26 miles per hour. Up a grade of 1 in 230, which is 4½ miles long, the 800 tons load of emply wagons was hauled at an average speed of 23 miles per hour. The locomotive also proved capable of hauling the 1,400 tons train on the level at 26 miles per hour. The general operation of the locomotive proved satisfactory in all respects throughout the test.

# Railway Literature.

LIVE-LOAD STRESSES IN RAILWAY BRIDGES, WITH FORMULAS AND TABLES. [By George E. Beggs, C.E. Chapman & Hall, Ltd. 8s. 6d. net.] Stresses caused by moving concentrated loads are here treated by the combined use of influence lines and algebraic methods. The influence line is connected by this treatment with tables of moment sums and load sums in a new and entirely practical manner. Equations are included which give an easy and exact solution of the maximum live-load stresses in any structure whose influence lines can be drawn, replacing, for the more complicated structures, such as cantilever and swing bridges, arches, etc., the old method of placing the wheel loading by trial and scaling the influence-line ordinates under the loads. A second feature of the text is the application of these equations to simpler structures, such as girder bridges (with and without panels), pier reactions, and Pratt trusses (with inclined and horizontal chords), in which these equations are transformed and simplified to meet the requirements of these ordinary cases. This leads to a series of simple formulas to meet the needs of every-day designing. To illustrate the application of these formulas, fully worked-out examples are given. The text is supplemented by a complete set of tables.

ENGINEERING AS A CAREER. [Percival Marshall and Co., Ltd. Price 6d. net.] This little booklet is primarily intended to set forth the principal features of the various branches of the engineering profession, with the idea of assisting fathers in deciding upon the best course to be pursued for their sons on leaving school. Railway and locomotive engineering receives attention; and besides general remarks consideration is given to the apprenticeship, pupilage, pay and prospects, workshop training, engineers schools and colleges and institutions and societies.

* * *

THE ROLLER BANDAGE. By Howard M. Preston. [John Bale, Sons & Danielsson, Ltd., Oxford House, Great Titchfield Street, London, W. Price 1s. net.] This publication is a guide to roller bandaging, and is a complement to the Guide to Triangular Bandaging already issued by the same firm. Mr. Preston has succeeded in making the subject clear and readily understood by diagrams showing the different steps of the application. The two handbooks together form a complete instructor to the usual bandages in vogue in First Aid and Home Nursing. We have no hesitation in strongly recommending them to all members of railway ambulance corps, particularly those seeking proficiency in the manipulation of the roller bandage.

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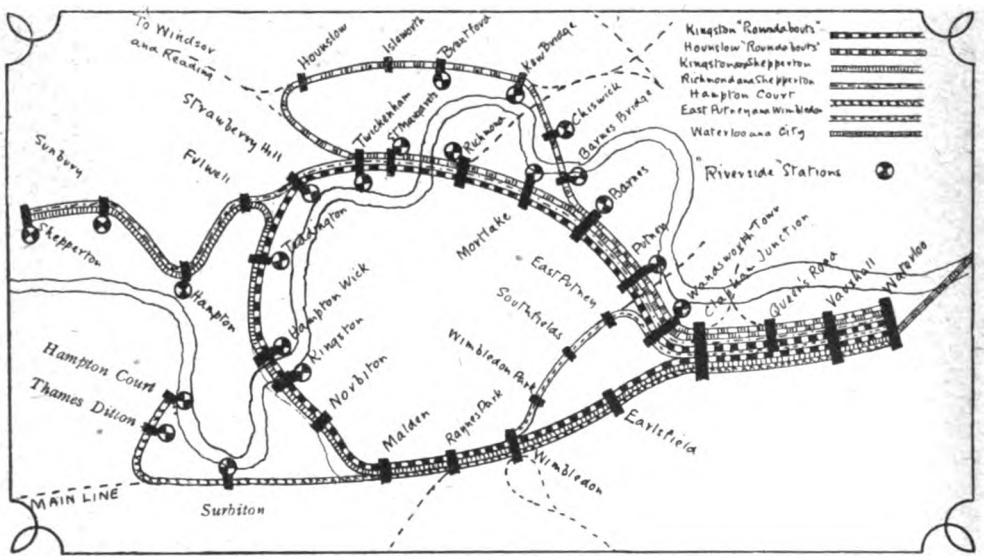
# The Riverside Electric.

By J. F. GAIRNS.

FOR some purposes it is useful to be able to refer concisely in distinctive fashion to a particular section of railway, or to indicate a certain characteristic; and if the London and South Western Railway is desirous of adopting a descriptive title for its electric sections the suggestion may be offered that "The Riverside Electric" would be eminently suitable, and entirely applicable in regard to the up-river residential and pleasure resorts from the City westwards as far as Shepperton and Hampton Court. Reference to a railway map will show how comprehensively the London and South Western Railway serves both banks of the river from Hammersmith onwards, for a considerable portion almost exclusively, while it is of interest to note that between Chelsea—the bridge here belongs to the West London Extension Railway of which the London and South Western Company is a partner—to Windsor, there are no fewer than seven railway bridges, all belonging to the London and South Western Railway.* It is true that Putney Bridge is at present used only by District trains, while for the time being no regular London and South Western passenger trains traverse the railway bridge at Kew; but Barnes, Richmond, Kingston, Staines and Windsor bridges are all included in the more important facilities provided by the London and South Western Railway, and the three former apply to the "Riverside Electric" services which constitute the subject-matter of this article. Furthermore, the London and South Western "tube" line from Waterloo to the City (Bank) burrows beneath the Thames at Blackfriars, while at almost the same place the London and South Western Wimbledon to Ludgate Hill trains cross the river by the South Eastern and Chatham railway bridge.




TRAIN ROUTES OPERATED ELECTRICALLY: LONDON AND SOUTH WESTERN RAILWAY.

* The Great Western Railway bridge at Windsor is just beyond the London and South Western series, and further up-river the Great Western becomes essentially the river-serving line.



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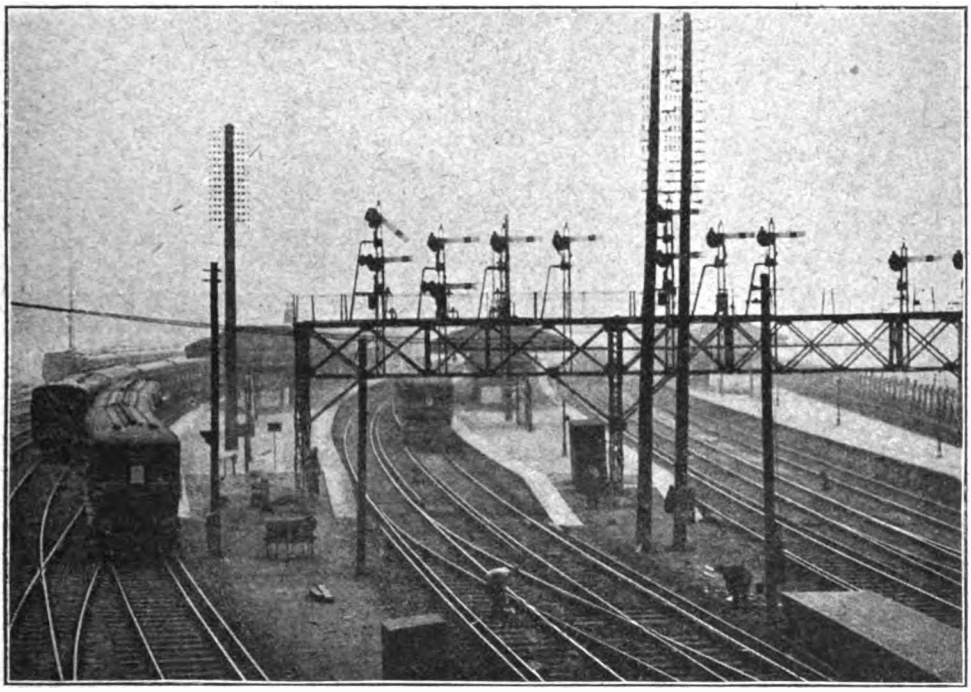
The mere fact that one railway crosses and recrosses the "Silvery Thames" so many times affords an indication of the comprehensive character of the train services under consideration; but there is still further justification for the title suggested in that from Waterloo to Twickenham, and round to Kingston *viâ* Teddington, the railway traverses almost continuously riverside territory; the Hounslow loop crosses to the north side and renders corresponding service on the other bank before striking across to Hounslow and then back to Twickenham; while the Shepperton branch—the "Thames Valley" line—provides the only railway facilities for a further series of waterside districts on the north bank, with the main line at Surbiton and the branch to Hampton Court on the Surrey side.

Further afield, the main line through Esher and Walton, the Chertsey branch, the Staines-Egham section, and the Windsor and Reading lines complete the riverside facilities provided by the London and South Western Railway.

It is, however, the electric lines which call for principal attention here, and the map reproduced on page 34, specially prepared, indicates not only the routes now operated electrically—with the Hampton Court section, electric working on which was announced to take effect on and from June 18th — but also the essentially "Riverside" character of so large a proportion of the mileage involved by the conversion.

Previous articles in the RAILWAY MAGAZINE—"A Great Electrification Undertaking," November, 1915, and "A 'Mathematical' Timetable," March, 1916, have described the main features involved in this comprehensive work, so that it is not necessary to deal with the more technical features again. As already mentioned, the full scheme involves equipment of the main line as far as Woking, and of all three routes to Guildford; but so far only the first stage is in question, and with the Hampton Court branch added, this is now completed. The sections covered, in the order of inauguration of electric traction, are :—

(1) Waterloo – Southfields – Wimbledon. October 25th, 1915.
(2) Waterloo – Richmond – Twickenham – Kingston – Malden – Wimbledon – Waterloo. January 30th, 1916.



ELECTRIC TRAINS AT CLAPHAM JUNCTION: WINDSOR LINES PLATFORMS.

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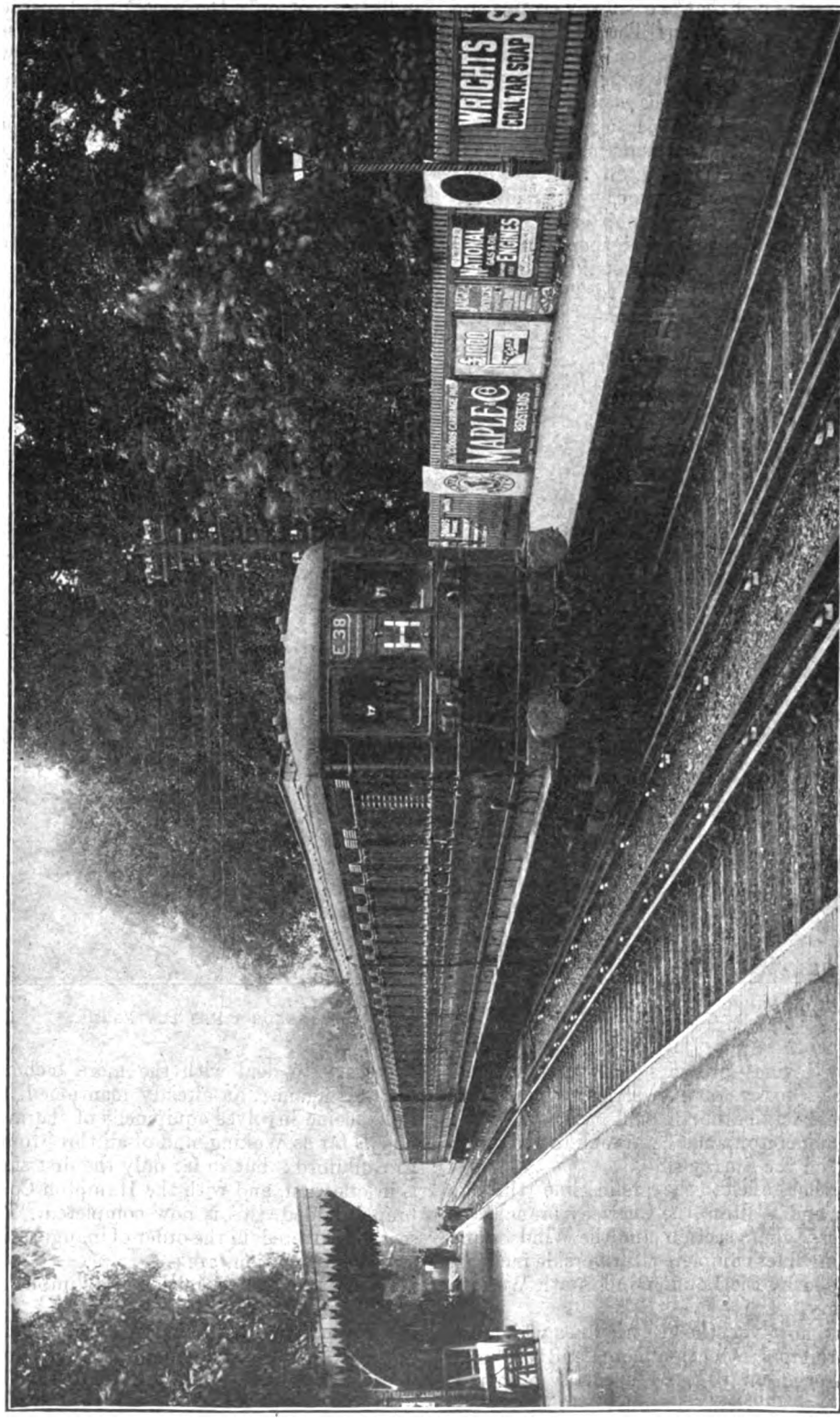


WATERLOO–HAMPTON COURT ELECTRIC TRAIN AT THAMES DITTON STATION.

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(3) Fulwell–Shepperton. January 30th, 1916.
(4) Hounslow loop. March 12th, 1916.
(5) Hampton Court branch. June 18th, 1916.

About 47 miles of lines are now equipped, covering no fewer than 35 stations, of which over twenty serve "Riverside" districts favoured for residential purposes, and a number also ranking as pleasure resorts.

The comprehensive character of the "mathematical" train services provided on the routes which have been operative for some time past has already been emphasised; and the same feature is retained in the new Hampton Court electric trains, which will run at 20-minute intervals. There will thus be no need for consulting timetables, except for the very early morning trains and the last trains at night, and travellers need no longer rush for the 5.23 p.m. on penalty of having to wait until 5.58 p.m., or whatever the train times may have been under the old conditions.

Now it will be sufficient to remember that Shepperton and Hounslow loop trains run half-hourly, and Southfields–Wimbledon and Hampton Court trains at 20-minute intervals, all trains running systematically at the stated minutes after each hour, thus justifying the term "mathematical," though it is by no means a new way of describing services of this kind.

The Hampton Court trains leave at 18, 38 and 58 minutes past each hour from 6.58 a.m. until 9.38 p.m., with early morning trains and late evening half-hourly trains until 12.8 a.m. Return trains leave Hampton Court at 17, 37 and 57 minutes past each hour. All stations are served except, of course, Queen's Road, and the standard time for the complete journey to Hampton Court from Waterloo is 33 minutes.

The full list of departures every hour from Waterloo, with the Hampton Court route added, and including the "letter" head-codes used for the electric trains, is as follows:

VIA MAIN LINE.

| | | |
|---|---|---|
| 3 (*a*) | Kingston "Roundabout" *viâ* Malden .. .. .. .. | V |
| 13 (*c*) | Kingston "Roundabout" *viâ* Malden .. .. .. .. | V |
| 18 | Hampton Court *viâ* Surbiton .. | H |
| 25 (*e*) | Shepperton *viâ* Malden .. .. | S |
| 33 (*a*) | Kingston "Roundabout" *viâ* Malden .. .. .. .. | V |
| 38 | Hampton Court *viâ* Surbiton .. | H |
| 43 (*c*) | Kingston "Roundabout" *viâ* Malden .. .. .. .. | V |
| 55 (*e*) | Shepperton *viâ* Malden .. .. | S |
| 58 | Hampton Court *viâ* Surbiton .. | H |

VIA WINDSOR LINES.

| | | |
|---|---|---|
| 8 (*b*) | Kingston "Roundabout" *viâ* Richmond .. .. .. | V |
| 14 | Wimbledon *viâ* Southfields .. | P |
| 18 (*d*) | Kingston "Roundabout" *viâ* Richmond .. .. .. | V |
| 22 (*f*) | Hounslow *viâ* Chiswick .. .. | O |
| 28 (*g*) | Hounslow *viâ* Richmond .. | O |
| 34 | Wimbledon *viâ* Southfields .. | P |
| 38 (*b*) | Kingston "Roundabout" *viâ* Richmond .. .. .. | V |
| 48 (*d*) | Kingston "Roundabout" *viâ* Richmond .. .. .. | V |
| 52 (*f*) | Hounslow *viâ* Chiswick .. .. | O |
| 54 | Wimbledon *viâ* Southfields .. | P |
| 58 (*g*) | Hounslow *viâ* Richmond .. | O |

(a) Does not stop at Queen's Road (outwards) and returning passes Wandsworth Town and Queen's Road.
(b) Does not stop at Queen's Road and Wandsworth Town (outwards), and in returning passes Queen's Road.
(c) Does not stop at Queen's Road (outwards), and in returning passes Queen's Road and Vauxhall.
(d) Does not stop at Vauxhall and Queen's Road (outwards), and in returning passes Queen's Road.
(e) Passes Queen's Road, Earlsfield and Hampton Wick.
(f) All stations outwards, passes Wandsworth Town and Queen's Road in returning.
(g) Passes Queen's Road and Wandsworth Town (outwards), and all stations in returning.
(h) Passes Queen's Road, Earlsfield and Raynes Park.

As first introduced these services were absolutely invariable, there being no alterations either "Saturdays Excepted" or "Saturdays Only," though short trains were run at lighter periods, and two three-car units together for the business pressure. Experience has, however, called for a few modifications.

Otherwise the train services are standard, except in the very early morning and very late evening, when trains are working into or out of service for the day. In addition, there are several extra steam trains on the Hounslow line, and two on the Shepperton route (running *viâ* Twickenham and semi-fast) to meet the business pressure, while the main line route is also served by trains on other steam-operated routes, and the Windsor lines also include the Windsor, Reading, and other longer-journey trains.

The net result is that most stations on

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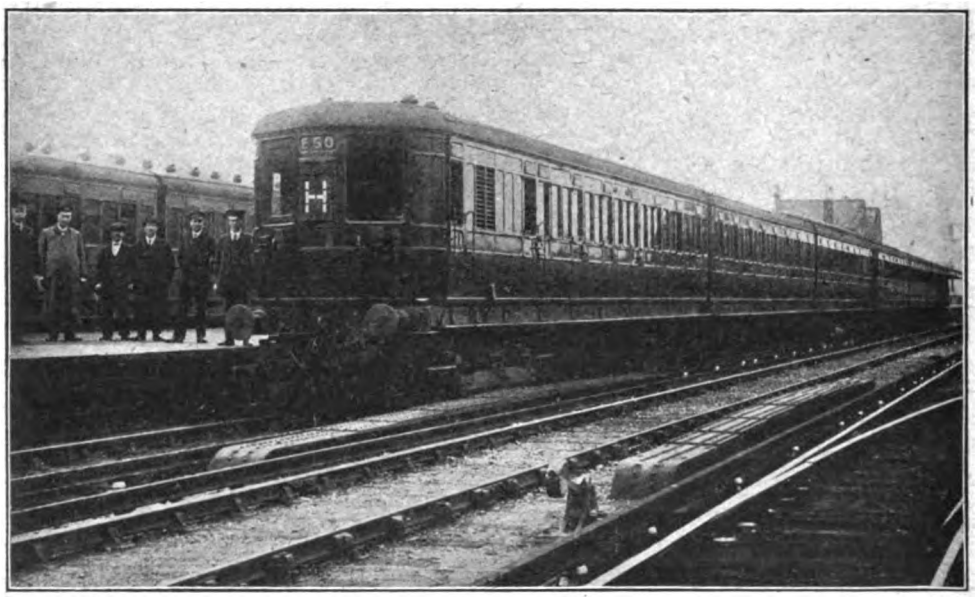
the Kingston "Roundabout" route have a ten-minute service of electric trains, and it is only on the Hounslow loop and the Shepperton branch that half-hourly intervals are involved, the longest period otherwise being 20 minutes, as on the Hampton Court and East Putney–Wimbledon routes. Compared with the conditions which previously obtained, the change is very great. In several instances there were indeed hourly or equivalent infrequent intervals, except at busy periods; and even then the fast trains offered little advantage over the standard times of the electric trains, with their rapid acceleration and smart running between stations.



ELECTRIC TRAIN AT HAMPTON COURT STATION.

To stand on one of the platforms at Clapham Junction facing towards Waterloo is, in fact, a veritable revelation. The table given above covers 20 electric departures from Waterloo hourly. At Clapham there are also 20 trains in the opposite direction coming under simultaneous observation; and with four to six electric trains each way on the adjoining London, Brighton and South Coast Railway lines, it is possible to count about 50 electric trains at once in a single hour.

Moreover, as these 50 trains are spread over 10 lines of rail (4 on the Windsor section, London and South Western Railway; 4 on the main line section, London and South Western Railway; with the two slow lines of the London, Brighton and South Coast Railway—the fast lines are electrically equipped, but not systematically used for electric trains), it is quite possible to have in sight simultaneously from 6 to 10 electric trains. And even then, so smoothly is the electric traffic now working, though there were a few "incidents" during the first day or two of inauguration, that one does not realise that there is anything of a "novel" character occurring, or that the electric trains are now more numerous than the steam trains passing the famous junction.

A feature of a number of the electric sets is that they include a saloon compartment to accommodate first-class "smoking" passengers. This is appreciated by season ticket holders who regularly travel together; though it is understood that this step was not altogether premeditated, but has arisen through the utilisation of a number of ordinary coaches including such saloon compartments, in the adaptation of existing rolling stock for electric traction.

Hitherto, the Sunday services have included Twickenham–Shepperton locals, connecting with the Kingston "Roundabouts" at Twickenham; but in view of the large volume of riverside traffic now dealt with on

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Sundays, due to the boating and holiday features which render so many of these riverside resorts attractive for day or half-day outings, the Shepperton trains are now run through to Waterloo twice hourly, but take the Richmond route instead of that *viâ* Malden as operated on weekdays. This gives a total of seven trains hourly leaving Waterloo on the Windsor line side—by no means a bad record for a Sunday service.

It is almost superfluous to refer to the attractions of the riverside districts served by these lines. Putney is the metropolis of Thames boat-racing, the section between Putney and Hammersmith bridges being specially favoured in this connection. Putney, Barnes, Mortlake, Chiswick, Kew, Brentford and Isleworth, are all in great residential favour, apart from their scenic, riverside, historical and other associations. Richmond, Twickenham, Kingston and Hampton Court need no introduction; they are recognised destinations for the tourist as well as important high-class residential areas. Teddington, Norbiton, Sunbury, Shepperton, Surbiton and Thames Ditton stations give access to other riverside districts which have much to commend them. And Wimbledon, Raynes Park, Malden, Hounslow and other places served offer residential and other advantages, while the river, if not actually adjacent, is never very far away.

The fact that "holidays" in the sense hitherto understood are not being taken accounts also for the wide favour which these services are receiving, on weekdays as well as on Sundays, for day or half-day trips to riverside resorts. Indeed, the "Summer Time" Act has added a further class of traffic, and in this connection reference may be made to a booklet issued by the London and South Western Railway, entitled "Long Evenings on the Silvery Thames." Half-an-hour or so takes the traveller well up the river, and several hours can be spent before returning in good time and still before darkness has fully set in.

KINGSTON "ROUNDABOUT" ELECTRIC TRAINS PASSING AT NORBITON.

It has yet to be seen what the London and South Western Railway will have to offer when the more distant sections contemplated in the complete scheme of electrification are equipped; but for a first stage the "Riverside Electric" constitutes an undertaking which ranks highly among the greater railway works of the present century.

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# A War-time Summer Season.

## War-Time Travel.

ANOTHER summer has come, and still our country is engaged in the Great War, involving conditions which, while favourable from a national point of view, render any suggestion of a return to a normal situation for the time being entirely out of the question. Therefore once again the special feature for so many years characteristic of our July numbers—the analyses of the new arrangements contemplated by the various railway companies to meet the traffic demands of the holiday period—cannot be included. It is, of course, inevitable that this should be so, for, in the ordinary sense, no holidays are being taken at all: a large proportion of the nation's manhood is now serving in His Majesty's Forces on sea and land; a further large proportion is engaged in munition work and other branches of national industry; the well-to-do classes are extensively concerned with various agencies associated with existing conditions; and there is a considerable section of the community to whom, with the serious increase in cost of living, holidays have become prohibitive.

At the same time, a new class of travel has come to the fore—the beauties and attractions of our own land are being "discovered" by thousands who in the past have made a practice of going abroad for their vacations; while the increased income of so many workers has enabled them to provide holidays of a character hitherto unknown for the benefit of their wives and families, even if they themselves are not able to participate on account of their long and continuous work. On the whole, therefore, it can be regarded as practically certain that the summer months will witness a considerable degree of railway travel, though not comparable with that of a normal year, and whether they desire it or no, the railways will be called upon to convey many thousands of passengers whose object in travelling is rest and recuperation, and this in addition to the large traffic already dealt with in connection, directly or indirectly, with national service. Probably a degree of such holiday travel may be classed as a luxury, and may merit description as a superfluity not altogether in keeping with the situation; but the larger proportion will be of an entirely legitimate character. Soldiers and sailors on leave, munition and other workers, Government officials and civil servants, managers, departmental chiefs, clerks attached to business concerns, and others, are not only entitled to such rest and relaxation as circumstances will permit, but nature demands that the "human machine shall not be taxed beyond limits." There are also the wives and children to consider, besides the thousands of wounded soldiers and a proportion of invalids, and so we may expect that the railways will be heavily taxed, even with restricted services, and the absence of all excursion and other special facilities except in Ireland. Consequently, on most railways it will be necessary to amplify the ordinary services to some extent, certain trains may have to be strengthened and in some instances divided, and the railway staffs will be heavily worked. While this fact must be faced, it is necessary, however, to emphasise the fact that luggage must be reduced to its lowest limits, if practicable to what can be conveyed by the passenger himself, and that travellers cannot expect the many facilities and conveniences hitherto given in the same measure as in normal times.

## Varied Destinations: A Suggestion.

THE suggestion may also be advanced that instead of concentrating upon favourite resorts intending holiday-makers should devote greater attention to places which are usually given a secondary status. All round the coast are to be found resorts which have much to offer in the way of scenic and natural attractions. The countryside, together with the Lake District, the Spas of Central Wales, the Peak, the Broads, Fenland, and other areas which have particular characteristics, in addition to the beautiful localities passed through with only fleeting attention by so many passengers on holiday to more noted resorts, often provide the best of what nature has to offer in regard to health-giving and restful associations. There is, indeed, abundant reason for departing from the old ideas and devoting attention to places, many of them quite near to London and other great centres of commerce and industry, which are usually overlooked or given scant attention.

As far as we can ascertain a considerable proportion of the summer travel will be entirely justified; and as far as conditions and other factors will permit, it is only fitting that direction and assistance should be available. Whether the usual summer handbooks are issued or not, railway officers will certainly be ready to advise intending passengers as to suitable destinations, and to provide information concerning places which are conveniently accessible by their own lines and connections and which may not, in ordinary circumstances, be thought of by intending passengers. The holiday guide enables the health



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seeker to make his own choice according to his individual requirements and circumstances.

In regard to such holiday literature as is being issued, we may mention the new edition of the Great Central Railway Guide to Health and Holiday Resorts. This, in common with those of other companies, includes lists of hotels, boarding houses, seaside and country lodgings. The Great Central Guide is, however, characterised by an A B C arrangement, that is, the various resorts dealt with appear in alphabetical order without regard to geographical location. This arrangement offers many advantages for purposes of reference, and the particulars given in each case are just those which are required. The selection available is, however, a much wider one than might be imagined, ranging from Aberystwyth, Blackpool, Douglas, Llandudno on the west coast, Bournemouth, Brighton, Eastbourne, Hastings, the Isle of Wight, South Devon, Weston-super-Mare, Falmouth, Newquay, in the south, and Scarborough, Cleethorpes, in the east, together with inland resorts such as Harrogate, Bath, Buxton, Stratford-on-Avon, Droitwich, and "The Dukeries." The explanation is that the "Central" position of the Great Central Railway, from the traffic point of view as well as geographically, together with its wide range of cross-country connections and inter-connections, in several instances by specially-routed through trains, renders this railway a very convenient one for a wide range of journeys.

### Belfast and County Down Railway.

FOR war-worn convalescents and other health-seekers the Belfast and County Down Railway provides admirable arrangements. The district served comprises Portaferry and Strangford Lough, Ardglass and Killough, Bangor and Donaghadee, Ballynahinch and its Spa, Newcastle, Bryansford, Rostrevor, and the justly celebrated Mourne Mountains. Slieve Donard Hotel, Newcastle, Co. Down, is owned and managed by the Belfast and County Down Railway Company. Completed in 1898 and fitted with all modern conveniences, the hotel is beautifully situated on the shores of Dundrum Bay, at the foot of the Mourne Mountains. For travellers who take an intelligent interest in railway working, the Belfast and County Down Railway provides much that is worthy of commendation, the management, under Mr. C. A. Moore, being of the most capable character. The Belfast terminus was reconstructed in 1913. The passenger yard has also been re-modelled, and a new signal cabin provided, containing one of the largest locking frames in Ireland.

### Cambrian Railways.

THERE are few who would dispute the peculiar aptness of Mr. S. Williamson, the enterprising general manager of the Cambrian Railways in styling the Cardigan Bay resorts served by the railway system he so capably controls "a veritable haven of convalescence." The beauty of this part of Wales has considerable fame and RAILWAY MAGAZINE readers who have not yet done so but desire to see it for themselves can obtain lists of lodgings and full information from Mr. Herbert Williams, superintendent of the line, Oswestry.

### Furness Railway.

To a mind filled with the horrors of shell-torn trench and ruined country side, it is refreshing to turn to the delightfully illustrated tour programmes, guides, etc., of the Furness Railway, to see what the always enterprising general manager, Mr. Aslett, has this year to offer those who need for a time the quiet and repose of the lovely lakeland so admirably served by the Furness line. Mr. Aslett announces an attractive series of rail, coach and steam yacht tours embracing Windermere, Coniston, Derwentwater, Furness Abbey and other famous holiday haunts in lakeland. On Windermere lake the Furness Railway's handsome steam yacht *Britannia* can be chartered for parties during the season. The yacht is licensed to carry 122 passengers. Furness Abbey Hotel is in the centre for Lakeland and beautifully situated. Military officers enjoying a brief respite from duty find it an ideal hotel amid surroundings where mind and body will speedily recover from the heavy tax imposed upon both in carrying on the great campaign "somewhere in France."

### Glasgow and South Western Railway.

FOR summer visitors to Scotland Mr. David Cooper, General Manager, Glasgow and South Western Railway provides a plethora of possibilities. Most holiday makers in stirring martial times are health seekers who thoroughly appreciate the dining cars, corridor carriages and sleeping cars that ply on this picturesque route between England and Scotland. Convalescent military officers will find magnificent golf courses along this company's system including the championship course at Prestwich and the famous links at Turnberry. Munition makers and others needing recuperation after arduous toil find all that they need at the Clyde watering places served by the Glasgow and South Western Railway's magnificent fleet of steamers. At Glasgow (St. Enoch), Ayr, Turnberry, and Dumfries are high-class railway owned hotels replete with modern comforts for the traveller on pleasure or business.

### Great Eastern Railway.

GREAT YARMOUTH, Lowestoft and other East Anglian coast towns served by the Great Eastern line should reap speedy and substantial benefit from Admiral Beatty's great victory over the German fleet off the coast of Jutland. What is left of the Kaiser's Armada mostly consists of battered leaking hulks in the harbours of Kiel and Wilhelmshaven, and there is little chance of the Norfolk and Suffolk coasts again receiving hasty visits from enemy war craft. Anyway safety during the summer season seems assured. The bracing air of the East Coast is a wonderful

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tonic and as the chances of hostile disturbances have been removed by the British victory there will doubtless be a large influx of health seekers to the favourite resorts overlooking the grey North Sea, where by day and night, week in and week out, Admiral Jellicoe and the Grand Fleet keep careful watch and ward.

### Great Northern Railway.

When the health seeker turns over in his mind the possibilities of the Great Northern Railway for conveying him to a suitable spot for the recovery of tone to his system his thoughts immediately revert to Skegness and the fact that "it is so bracing." There are few adults in the British Isles and certainly none among Railway Magazine readers who do not well remember the introduction of the famous Great Northern "Skegness" poster and the intense public interest it created. Nevertheless King's Cross station forms the starting point for travellers to many valuable health resorts not advertised in quite such a startling manner. Harrogate the celebrated English spa is reached from King's Cross after a comfortable journey of about five hours, while Scarborough, Whitby and other Yorkshire coast resorts are equally available. The East Coast route to Scotland commands an enormous traffic. Lovers of cathedral cities are well served by the Great Northern line which also shares with the Great Eastern, the London and North Western and Midland the distinction of serving the ancient university town of Cambridge.

### Great Western Railway.

The necessity for holiday literature even in the second year of a great war has not been overlooked at Paddington. Torquay, the magnificent Devonshire holiday resort was created by the Napoleonic wars and if holidays were needed in the days of the Corsican, they are beyond question beneficial in these times when another military adventurer is making an abortive bid for world-wide power. "Holiday Haunts" in England, Wales and Southern Ireland has again been issued in a new edition for 1916. It consists of 600 profusely illustrated pages full of just the kind of information an intending health seeker desires. Published at 3d. it can be obtained post free for 5d. extra, from the Superintendent of the Line, Paddington Station, London, W.

### Highland Railway.

War makes or breaks the reputations of places as well as of men. The closing of the Spas in the Teutonic Empires to British health seekers has brought into prominence the advantages of health resorts in the homeland. The charms of Strathpeffer Spa, in the Highlands of Scotland, provide a case in point. There were many people before the war who understood and appreciated the value of its sulphur waters, proved by analysis to be the strongest in Europe; but now those who in peace time would undertake a costly and tedious journey to some foreign Spa can find at Strathpeffer rest and recuperation amid ideal surroundings. Thus does Strathpeffer come into its own.

Railway-owned, the Highland Hotel at Strathpeffer Spa is situated beside the baths, the wells and the gardens. It is of modern construction and equipment and provided with private suites, electric lifts and electric light. Its inclusive charges are extremely moderate at all times, but a special low tariff is in operation from the opening in May until the middle of July.

Railway Magazine readers in London and the Midlands can travel by trains leaving Euston or King's Cross about 8 p.m., while passengers from the North of England, or others who dislike night journeys, should travel to Edinburgh or Perth, stay the night there, and proceed by one of the trains in the undernoted service:

| | | a.m. | a.m. |
|---|---|---|---|
| Edinburgh (Waverley) .. | depart | 7.45 | 10.10 |
| Glasgow (Buchanan Street) | ,, | 7.20 | 10.0 |
| Dundee (West) .. .. | ,, | 8.5 | 10.0 |
| Perth .. .. .. | ,, | 9.30 | 11.50 |
| | | p.m. | p.m. |
| Dingwall .. .. .. | arrive | 3.29 | 5.47 |
| Strathpeffer Spa .. .. | ,, | 3.55 | 6.0 |

Needless to say, owing to circumstances arising out of the war, these times are subject to alteration without notice.

The railway journey through Scotland is full of vivid interest, not only to those who, like most Railway Magazine readers, take a deep concern in all that appertains to railway working and with whom the Highland Railway is a favourite system; but likewise to travellers from afar who desire a complete change of scene and environment.

Having arrived at Strathpeffer, the visitor finds himself among most romantic surroundings,

PAVILION AND RECREATION GROUNDS: STRATHPEFFER SPA.

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in an ideal climate. Strathpeffer Spa is not merely a place for invalids, it is a haunt where those who need a change, but are not exactly run down, may find plenty of sport and pastime, while the district is exceptionally well served with charming walks and drives to scenes of romantic and historical interest. For the votary of golf ample provision has been made, while for the angler there is abundant sport.

Mr. Robert Park, the General Manager of the Highland Railway, is circulating gratuitously from his office at Inverness an admirably produced booklet of about forty pages, which imparts concise and accurate information regarding the attractions of Strathpeffer Spa.

This booklet should prove of great value to health-seekers and those who through war strain are fearing a nervous breakdown. It is a safe and reliable guide to medical advisers by reason of the very full particulars it gives concerning the waters, the baths, and the climate of Strathpeffer. Medical men who read the RAILWAY MAGAZINE, and they are more numerous perhaps than some people imagine, are strongly recommended to secure a copy of Mr. Park's valuable booklet.

GOOD ADVICE EFFECTIVELY OFFERED.

**London and North Western Railway.**

BRITISH railway travel under conditions at present prevailing has brought into prominence the necessity for good hotel accommodation in close proximity to the great railway termini or junction stations. Travellers on the London and North Western Railway are well provided for in this respect. In London there is the Euston Hotel, so well known to passengers between the metropolis and Ireland and Scotland, while modernly equipped well-managed establishments are under the company's control at Birmingham, Liverpool, Bletchley, Crewe, Holyhead, Greenore and Dublin. At Preston there is likewise the Park Hotel in the management of which the Lancashire and Yorkshire Railway takes a share. Telegrams ordering rooms at any of these hotels are sent free of charge from any station on the London and North Western and Caledonian systems on notice being given a railway official.

**Hull and Barnsley Railway.**

THE opening of the King George Dock at Hull, jointly owned with the North Eastern Railway, should have inaugurated a further phase of development on the part of this growing line. Unfortunately, this has been of rather more national value and importance than to the railway company itself; though in due course the line whose operations are directed by Mr. Edward Watkin will no doubt benefit very considerably. Experience has, however, shown that this dock, in view of the excellence and completeness of its equipment of machinery and appliances, will figure very prominently in the shipping and industries of the east coast; and the connections and other facilities arranged with the North Eastern, Midland, Great Northern and other lines render the Hull and Barnsley Railway very favourably situated for industrial traffic of all kinds.

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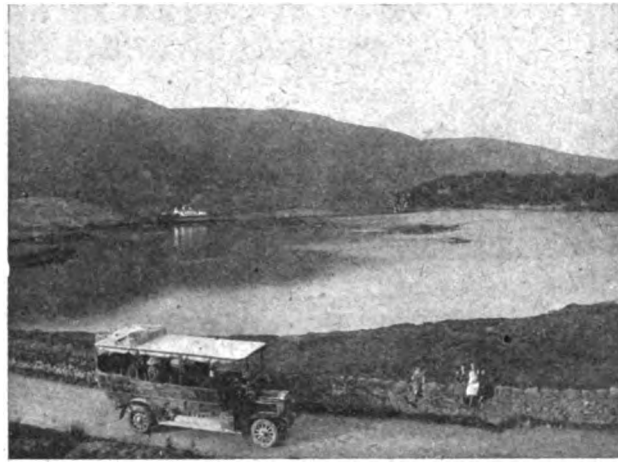
### Lancashire and Yorkshire Railway.

ESSENTIALLY an industrial line, the Lancashire and Yorkshire Railway has in the Ribble Valley and other picturesque areas adjacent to the manufacturing towns of Lancashire and Yorkshire, ideal districts for day or half-day tours and for short holidays with which most business men now have to be content. Blackpool, Southport and other coast resorts are also conveniently adjacent to the industrial districts of the north; while the Lancashire and Yorkshire is connected up by through services with the London and North Western, Midland, North Eastern and other lines, thereby giving access, in many instances by through services, though these are not so full as in normal years, with most of the favourite places on both the east and west coasts, as well as to the north and south for longer journeys. To the manufacturer and business man concerned with the erection of factories and the development of British trade and industry, the Lancashire and Yorkshire Railway is almost ideally situated in regard to plenitude and convenience of transport and distribution facilities.



TOURING CAR: MIDLAND GREAT WESTERN RAILWAY OF IRELAND.

### London and South Western Railway.

THE London and South Western Railway issue their "Hints for Holidays." This is prepared on a geographical basis, the various sections being devoted to the counties served, Devon, Cornwall, Dorset, Somerset, Wilts, Hants, and Surrey, together with reference to the Thames Valley and the Channel Islands. Useful maps are included, and attention is given to countryside rambles. Copies of the booklet can be had on application to the Publicity Department at Waterloo station, London, S.E.

### London, Brighton and South Coast Railway.

LAST September third class Pullman cars were, as RAILWAY MAGAZINE readers remember, introduced into the services of the Brighton Railway. These are proving particularly popular, the additional comfort for the small supplementary charge of ninepence per seat being greatly appreciated. Brighton and Eastbourne are the resorts served by the cars.

### Metropolitan Railway.

IN normal times this line would be directing attention to the wonderfully picturesque districts served by its own routes to Harrow and Uxbridge, and jointly with the Great Central Railway to Chesham and Aylesbury. Many usual conveniences still apply, and from personal experience, we can commend some of the country walks rendered available by trains from Baker Street (including through trains to and from City stations), and from Marylebone. Such rambles are admirably adapted for a day or half-day run out to the country, and if once sampled are certain to be repeated. Although no cheap fares are in operation, the distances are not great so that cost need never be heavy. For residential purposes many of these districts are realising special favour, and the excellence of the railway facilities provided enables full advantage to be taken of the natural beauties of the district.

### Midland Great Western Railway of Ireland.

WITH the Continent closed to those who need change of scene and recuperation from the stress and strain of war work comes the opportunity of emphasising the claims of Ireland as a holiday haunt. Mr. Keogh, General Manager of the Midland Great Western Railway, has not been slow in taking advantage of the fact that the railway he so ably controls serves a most attractive territory for those who desire a complete change of scene and a healthful holiday far remote from the districts where factory chimneys grow and the din of war work jars the tired nerves of the convalescent warrior or overworked munition manufacturer, to say nothing of other sections of the British public who suffer from the severe stress of wartime claims upon their business capacity. From his office at Broadstone Terminus, Dublin, Mr. Keogh's Traffic Manager, is forwarding to potential travellers four illustrated books priced one penny each, respectively entitled, "Achill," "Connemara," "Galway," and "Sligo," and one at sixpence—a fine book including a useful map—is entitled "Connemara, Achill, and the West of Ireland." These books are well illustrated and delightfully free from padding of

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any description. They contain just the information an intending traveller desires, and he gets it in a succinct and attractive form.

The railway company owns splendidly managed hotels at Recess, Connemara, and at Mallaranny, Co. Mayo, and there are numerous other hotels advertised in the books under notice, so that British visitors need have no fear in regard to accommodation. During the tourist season road motor coaches are run by the Midland and Great Western Railway between Clifden and Westport, a distance of 50 miles. One of the coaches is illustrated on page 44. Travelling on the Midland and Great Western Railway is full of lively interest to the passenger. As a railway system it is managed excellently well, while the attractions it has to offer the intending tourist are they not printed in the admirably produced publications already mentioned ?

### Midland and South Western Junction Railway.

As a "junction" railway, though it is quite independent, this line provides valuable connections between the cross-country lines of the Midland and Great Western Railways and the south coast, more particularly at Southampton. For war traffic this line, of which Mr. John Davies has been General Manager for a considerable period, has proved almost invaluable ; and these advantages also apply largely in normal times, the connections, including several through services between Cheltenham (conveniently situated with reference to train services from Birmingham, the "Black Country," Worcester, Gloucester, etc.) and the whole of the London and South Western Railway, at Andover Junction with the West of England line, and at Southampton (for the docks), with the Bournemouth and Weymouth route. The Midland and South Western Junction Railway has also much to commend it from the scenic and touring point of view.

### North Staffordshire Railway.

REST and recreation can be found at Rudyard and excellent hotel accommodation likewise. Visitors to North Staffordshire interested in toy railways, and among RAILWAY MAGAZINE readers, these are not a few, should not fail to travel over the Manifold Valley line. In addition to the chief offices at Stoke-on-Trent the North Staffordshire Railway has agents who will give information to intending travellers at 64, Whitworth Street, West Manchester, and 20, Water Street, Liverpool.

### The Plymouth, Devonport and South Western Junction Railway.

ALTHOUGH for practical purposes the whole of the route traversed by London and South Western main line Plymouth trains is operated over South Western metals until Great Western territory is reached, the section from Lydford to Devonport is actually leased from the Plymouth, Devonport and South Western Junction Railway. But in addition to this length of 29¼ miles there is also a section which is worked by the owning company, and which is generally referred to as the Bere Alston (where connection is made with the main line) and East Cornwall line. This section of 9¾ miles is under the direction of Mr. S. G. Hartnell, with headquarters at Callington. Traffic is worked by three locomotives. On July 1st, 1891, the Plymouth, Devonport and South Western Junction Railway bought up the old East Cornwall Minerals Railway, originally opened in 1872 to connect the mines and quarries in the neighbourhood of Gunnislake and Calstock with the banks of the River Tamar near Calstock. There was, however, no connection with any other railway, and eventually a new line was built extending from Bere Alston station on the main line to Plymouth, crossing the Tamar by a notable viaduct and passing by a new route to join the old East Cornwall line near Gunnislake. A portion of the old line was not reconstructed, including the original rope-operated incline to the quay at Calstock, and in place of this a truck lift was erected to connect the viaduct over the river with the quayside below. A full description of this line as reconstructed and extended was given in the RAILWAY MAGAZINE for February, 1908, in which year it was opened for passenger traffic after conversion and the completion of the new works. The line includes severe gradients. The Calstock viaduct consists of twelve 60 ft. arches, and rail level is 120 ft. above the river. The lift provides for raising wagons 113 ft. Apart from industrial importance, Calstock and Gunnislake attract large numbers of visitors in summer, some coming by train to Bere Alston, others by steamer up the Tamar. Near by are the far-famed Morwell Rocks ; and both for scenic interest and from the railway point of view the line is well worth a visit.

### South Eastern and Chatham Railway.

IN "magical Margate," the railway under Sir Francis Dent's able administration possesses a resort for health seekers which in many respects is like unto the laws of the Medes and Persians for it changes not. The Margate air is just as health-giving as it was before the war and such is the sense of security prevailing, there are visitors who declare they sleep as sound o' nights as they did in the inland towns, while during the day they would deem themselves in luck should a German Taube appear and provide a gratuitous aerial entertainment. For intending visitors to Margate and other parts of Kent the South Eastern and Chatham Railway has an illustrated handbook entitled "Through the Garden of England." Copies can be obtained from the Superintendent of the Line, London Bridge Station, S.E.

### "The Underground."

THE announcement is made that owing to the paper shortage and in order to effect economies during the continuance of the War, the

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Underground Railways are discontinuing the printing of pictorial posters for exhibition on their stations. This will mean that the many new and striking posters which adorned the stations will no longer be a familiar feature of the "Tubes," and the spaces originally occupied by these bills will in many cases remain blank. For some considerable time past, apart from the paper shortage, it has been an increasingly difficult matter to spare staff to do the necessary posting, and for the future only essential notices relating to the working of the trains will be exhibited at the stations. Notwithstanding this action, it is well to remember that directly and indirectly the Metropolitan District and the "Tubes," both independently and in conjunction with the London General Omnibus Co. and the Metropolitan Electric Traction Tramways provide for a wonderful series of short trips suitable for "Summer Time" evenings, Saturday afternoons and on Sundays at slight expense and with facility and convenience.

MANCHESTER'S FIRST ELECTRIC RAILWAY.
A striking and topical poster issued by the Lancashire and Yorkshire Railway.

**Wirral Railway.**

INTENDING visitors to the Wirral Peninsula will find that Mr. J. H. Burns, the General Traffic Manager of the excellently conducted Wirral Railway, has provided a wealth of facilities for all who seek health and recuperation in the popular pleasure resorts of New Brighton, Meols, Hoylake, West Kirby, etc., the latter being known as the Mentone of the North. From his office at New Brighton station, Cheshire, Mr. Burns will forward on application a gratuitous copy of a well-illustrated booklet describing the holiday and residential possibilities of the peninsula. Railway enthusiasts will not be ill-pleased to find in the booklet some railway and station views. RAILWAY MAGAZINE readers have learned from the illustrated article included in the July number two years ago that there is much in Wirral Railway working to interest the railway student, while the ordinary tourist who visits the district for the first time finds that which makes him desire more than one return. Its healthfulness for convalescents, particularly those who are suffering from nerve strain or overwork, cannot be over-estimated. In the Wirral Peninsula the golfer finds a paradise, and here likewise is one of the principal convalescent homes for railwaymen.

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# The York and North Midland Railway.

## [No. III.]

By H. H. MEIK.

(*Continued from page* 402 *June* RAILWAY MAGAZINE.)

V.—THE YORK AND BEVERLEY LINE.

IN the autumn of 1845 the York and North Midland Company lodged a Bill in Parliament for the construction of a line from York to Market Weighton and Beverley *vid* Stockton and Pocklington, and on June 18th, 1846, they obtained Royal Assent thereto. The line branches off from the York and Scarborough line at Bootham Junction, 1 mile 54 chains from the present York station, and was opened as far as Market Weighton on October 3rd, 1847, the length of line being 20 miles 51 chains, and was originally constructed as a double line.

In September, 1849, the names of the intermediate stations were, Huntington, Stockton, Gate Helmsley, Stamford Bridge (near which the railway crosses the River Derwent on a viaduct), Fangfoss, Pocklington, Burnby, and Shipton and Londesborough. The names of several of these stations have been changed as follows, viz., Huntington is now Earswick; Stockton, Warthill; Gate Helmsley, Holtby, and Burnby, Nunburnholme.

In 1848 the Market Weighton station consisted of a single platform, a second platform being added in 1870.

In September, 1849, there were three stopping trains each way on week-days taking one hour and ten minutes for the journey from the original York station. There were no trains on Sundays.

Owing to various reasons the Market Weighton and Beverley section of the line was not proceeded with, and in 1849 the financial position of the York and North Midland Company had become such that a special meeting of the company was held on May 24th of that year, when a committee of investigation was appointed to enquire into the affairs of the company. In the conclusion of their third report laid before the meeting of shareholders on October 31st, 1849, they pointed out that the Beverley extension " may be desirable at some future time provided the landowners on the line can be arranged with on moderate terms and all unnecessary and expensive requirements on their part got rid of. A stipulation at present existing with Lord Hotham as to the manner in which certain works shall be constructed through his property, acts as a complete obstacle to the making of this extension with any reasonable prospect of remuneration to the shareholders. The Market Weighton line is incomplete without this extension."

The extension in question was not carried out until the North Eastern Railway obtained an Act dated June 30th, 1862, to construct the line, which was opened for traffic on May 1st, 1865.

VI.—SELBY AND MARKET WEIGHTON LINE.

One of the many schemes promulgated by the York and North Midland Company during 1845 was that for a line from Selby to Market Weighton and a Bill for the construction of the line was presented to Parliament which received Royal Assent on June 18th, 1846. The line was of easy construction and was opened on August 1st, 1848. It was originally a single line and was doubled in 1894.

The line starts from the Hull and Selby Railway on the eastern side of the River Ouse, 63 chains from Selby station and runs in an almost direct line north-east to a point 4 chains west of Market Weighton station, where it joins the York and Market Weighton line. Its length is 16 miles 45 chains.

In September, 1849, there were only two intermediate stations shown in the time-tables—Bubwith, near which the line crossed the River Derwent, and Holme, but in a note to the time-table it was stated that on Mondays the first train from Market Weighton to Selby " stopped at Foggathorpe and Duffield Gates to take up passengers for Selby market." These two places were evidently what would be now termed " halts."

There were three stopping trains each way



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on week-days all of which took 50 min. for the journey. There were no Sunday trains.

In June, 1853, the time-table was as follows, viz.:

SELBY AND MARKET WEIGHTON.

| | 1st, 2nd & Govt. | 1st, 2nd & 3rd. | 1st, 2nd & 3rd. |
|---|---|---|---|
| | a.m. | p.m. | p.m. |
| *Selby* .. .. .. | 11.10 | 7.45 | 3.30* |
| Cliff Common Gate .. | 11.20 | 7.55 | 3.40 |
| Duffield Gate .. | 11.25 | 8.0 | 3.45 |
| Menthorpe Gate .. | 11.31 | 8.6 | 3.51 |
| *Bubwith* .. .. | 11.37 | 8.12 | 3.57 |
| Foggathorpe Gate .. | 11.47 | 8.22 | 4.7 |
| *Holme* .. .. | 11.57 | 8.32 | 4.17 |
| Harswell Gate .. | 12.5 | 8.40 | 4.25 |
| *Market Weighton* .. | 12.15 | 8.50 | 4.35 |

* Market train on Mondays only.

MARKET WEIGHTON AND SELBY.

| | 1st, 2nd & Govt. | 1st, 2nd & 3rd. |
|---|---|---|
| | a.m. | p.m. |
| *Market Weighton* .. .. | 8.45* | 5.15 |
| Harswell Gate .. .. | 8.52 | 5.25 |
| *Holme* .. .. .. | 8.57 | 5.30 |
| Foggathorpe Gate .. | 9.6 | 5.39 |
| *Bubwith* .. .. .. | 9.15 | 5.48 |
| Menthorpe Gate .. .. | 9.20 | 5.54 |
| Duffield Gate .. .. | 9.24 | 5.59 |
| Cliff Common Gate .. | 9.28 | 6.4 |
| *Selby* .. .. .. | 9.35 | 6.15 |

* On Mondays this train will leave Market Weighton at 8.30 and the stations a corresponding time earlier.

On Mondays an extra train will leave Market Weighton for Selby at 2 p.m., reaching Selby at 3.0, and returning to Market Weighton at 3.30 p.m.

On Tuesdays a train will leave Market Weighton for Selby at 6.30 a.m. calling at all the stations and reaching Selby at 7.20, meeting a train to Hull and Leeds markets.

The frequency of the word "Gate" being added to the various names leads one to suppose that they were level crossings. Since 1853 Duffield Gate has been closed and a new station called High Field opened between Bubwith and Foggathorpe. The name "Harswell Gate" has been changed to Everingham.

### VII.—LINES FOR WHICH ACTS WERE OBTAINED BUT WHICH WERE AFTERWARDS ABANDONED.

On June 26th, 1846, the York and North Midland Company obtained an Act for a line from their main line near Copmanthorpe to Tadcaster and Leeds, joining the Leeds and Selby line at or near Garforth.

This proposed line was to use the Harrogate and Church Fenton line for a distance from a little to the south of the original Stutton station (now closed), whence it was to pass Towton, to Aberford, where a colliery line or tramway was to be utilised as far as Garforth. The Act also provided for a branch from the Leeds and Selby Railway, about a mile east of Marsh Lane to join the North Midland and the Leeds and Bradford Railways near the original Hunslet station (now goods) of the former company.

The line was forced on the company as a protective measure against proposed opposing schemes. Soon after obtaining the Act a portion of the line between Tadcaster and Copmanthorpe was commenced on the north side of Tadcaster and proceeded with to a considerable extent including a viaduct across the Wharfe incurring an expenditure of between £30,000 and £40,000, and further outlay would have been required to complete the line. The committee of investigation before referred to came to the deliberate conclusion that the line should be left as it was, at all events for the time being. If, therefore, it was the wiser course to defer the Tadcaster line, it followed as a matter of course that the Stutton and Garforth connecting line should also be suspended, although the committee suggested that it might be desirable at some future day to carry out and complete the scheme. These lines were afterwards abandoned.

During the session of 1847 an Act was obtained for a branch from the Church Fenton and Low Harrogate line, at a point near the latter place to High Harrogate (afterwards known as Starbeck), Knaresborough and Boroughbridge, where it was to join the Boroughbridge branch of the York, Newcastle and Berwick Railway.

The construction of the line was not proceeded with at the time, and the expenses incurred were confined to those obtained in procuring the Bill and a small amount in connection with the engineering department. In 1849 the line was in abeyance and was subsequently abandoned.

The present Knaresborough and Boroughbridge line was constructed by the North Eastern Railway under an Act dated July 23rd, 1866.

The Market Weighton and Beverley line is fully commented on under the heading of the "York and Beverley Line."

In the session of 1846 the Company procured an Act authorising them to construct a line from Arram on the Hull and Bridlington Branch of the Hull and Selby Railway,

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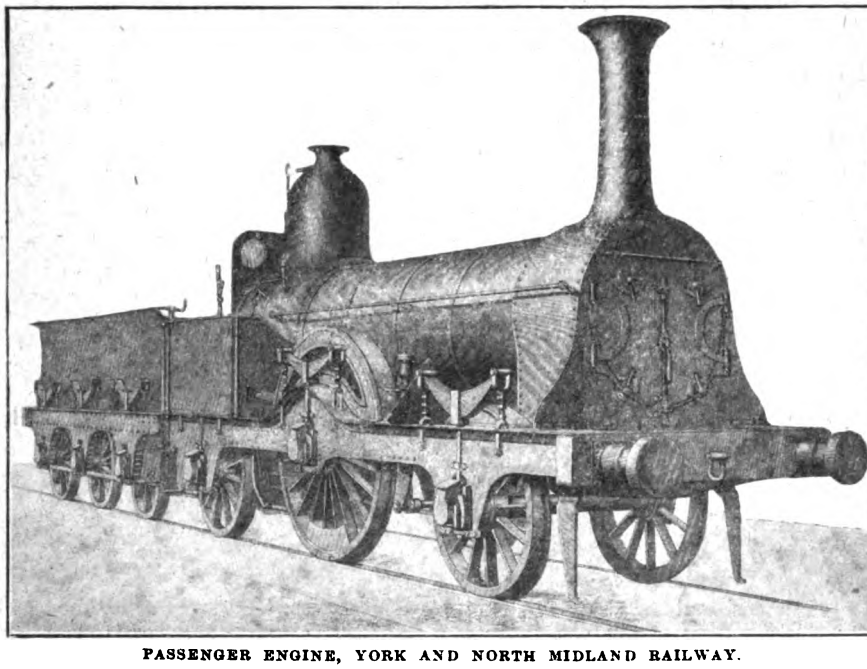
eastwards to Hornsea *vid* Leven, practically running parallel with the Leven Canal. The construction of this line had not been commenced in 1849 and was afterwards abandoned.

In the same session an Act dated June 18th, 1846, was procured for a line from Grosmont, on the Whitby and Pickering line along the valley of the Esk *vid* Glaisdale and Danby to Castleton. The construction of the line was deferred on the recommendation of the committee of investigation in 1849, and was afterwards abandoned.

The line was eventually constructed by the North Eastern Railway and opened on October 2nd, 1865.



PASSENGER ENGINE, YORK AND NORTH MIDLAND RAILWAY.

In 1849 the only engagement the company had with regard to other railways was a subscription of £40,000 to the Malton and Driffield Railway. There was no Parliamentary sanction for the subscription, but it was entered into with the approval and also by resolution of the shareholders at the half yearly general meeting held on January 16th, 1846.

### Lines acquired by the York and North Midland Railway Company.

#### I.—Leeds and Selby Railway.

When the advantages of steam traction had been fully recognised it was perceived that the construction of a "Rail-Road" from Leeds to Selby and Hull or Goole would not only be remunerative but would also be conducive to the prosperity of both towns. The importance of connecting Leeds with Hull arose from the circumstance that the raw material imported into Hull was mostly consigned to Leeds woollen merchants and had been conveyed thereto chiefly by the rivers and canals. So great were the advantages of a railway between Leeds and Selby then considered, thereby shortening the distance from 29½ miles by canal to 20 miles by rail, to say nothing of the time and delay by canal in passing through nine locks, that the capital for the prosecution of the line was readily forthcoming, and in 1829 a company was formed, and Mr. James Walker, C.E., instructed to survey the country between the two towns and to report. His report was submitted to a meeting held at Selby in July, 1829, and unanimously adopted, and during the session of 1829–30 a Bill for the line was lodged in Parliament. A very strong opposition was put up against the Bill by the Aire and Calder Navigation and various landowners, but the Bill successfully passed through all its stages and received Royal Assent on May 29th, 1830. The Act was entitled "An Act for making a railroad from the town of Leeds to the River Ouse



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within the parish of Selby in the West Riding of the County of York."

Authorised share capital was £210,000 with power to raise loans to the amount of £90,000. A second Act, dated July 3rd, 1835, authorised an additional loan of £40,000. The first general meeting was held at Selby in July, 1830, when the directors were appointed, the chairman being Mr. John Broadley.

The line was publicly opened on September 22nd, 1834, and formed a link in the cross country run from Liverpool to Hull. The Leeds depôt, which was built at a cost of £10,300, was situated at Marsh Lane which, as a guide book of the period stated, was "one of the most unpleasant and dirty, but likely soon to become one of the most improving parts of the town of Leeds. The company's warehouses are admirably arranged, they are vastly extensive and afford every possible convenience for the reception and transmission of passengers and goods."

The line was constructed under the superintendence of Messrs. Walker and Burges, Civil Engineers, London. Original stations other than the two termini were as follows, viz., Garforth, Micklefield, Milford, "York or Old Junction" and Hambleton.

Marsh Lane station stood in a court-yard and was of a neat elevation, containing a booking office on the ground floor, with other offices above on the same level as the line. There were, however, no platforms, and passengers were obliged to mount into the carriages by steps.

Selby station (which still remains and is now used as a goods station) cost £18,300, and was similar to the Marsh Lane one in respect that it had no platforms, otherwise it was a spacious and well proportioned building. The line passed through the station to the steamboat jetties on the River Ouse. The station was 245 ft. long by 96 ft. wide, and contained six lines. The two centre lines for passenger trains terminated near the centre of the building where there were two turnplates for transferring engines and carriages from one line to the other. The other four lines ran through the station to the jetties which were separately arranged for passengers and merchandise, coal, etc. The roof of the building was supported by cast iron pillars 19 ft. 6 in. high.

**Arrangements issued by the Railway Company,**
***May 8th*, 1835,**

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**THE Public is respectfully informed, that for the greater accommodation of Passengers travelling by the Railway, an additional Train has been put on the Line, and every day (Sunday excepted) during the Summer Months. the Carriages will start in the following Order:—**

***FROM THE DEPOT, MARSH-LANE, LEEDS*:—**
**At *Seven* o'Clock in the Morning, *Two* o'Clock, and *Half-past Five* o'Clock in the Afternoon.**

***FROM THE SELBY STATION*:—**
**At *Half-past Eight* o'Clock in the Morning; *Half-past Five* in the Afternoon; and on the Arrival of the *Steam-Packets* from *Hull*.**

**SUNDAY.**

**From LEEDS, at *Eight* o'Clock in the Morning, and *Half-past Four* in the Afternoon.**

**From SELBY, Do. do. do. do. do.**

***Fares.***

| | s. | d. | | s. | d. |
|---|---|---|---|---|---|
| Per 1st Class Coaches, | 3 | 0 | & through to Hull, Best Cabin, | 5 | 0 |
| Per 2nd Do. do..... | 2 | 0 | Do. do. do.... | 3 | 0 |
| Per 1st Do. do..... | 3 | 0 | Do. to York, Inside Coach, | 7 | 0 |
| Per 2nd Do. do..... | 2 | 0 | Do. do. Outside Coach, | 4 | 6 |

EXTRACT FROM "THE TOURISTS' COMPANION" GIVING PARTICULARS OF THE LEEDS AND SELBY TRAIN SERVICES FOR HULL IN 1835.

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Intermediate stations were each furnished with a neat cottage building, "wherein besides the passengers waiting-room, there was a living-room and a bedroom for the station clerk." Ruling gradient of the line was 1 in 135 for 3 miles 20 chains on the west side of Milford. The principal embankment was near York Road Junction. It was 1½ miles long and 50 ft. high. The only tunnel on the line was through Richmond Hill, 8 chains distant from the Marsh Lane terminus. It was 700 yards in length, the width at the springing of the arch being 22 ft., and the height from the level of the rails 17 ft.

There were 43 bridges carrying the line over and under roads, and also there were about 16 level crossings and 34 occupation field crossings. "Some of the bridges were of very bold design and of excellent proportions, and all were built of sufficient width for four lines of way which although costing more at the time of construction, afterwards turned out to have been a very wise provision."

The locomotives originally used were 4-wheeled and were chiefly constructed by Messrs. Fenton, Murray and Co., of Leeds, and Messrs. Kirtley and Co., of Warrington, and up to 1843 they were used promiscuously for passenger and goods traffic. In 1839 the locomotives of the line were the *Hawk*, *Dart*, *Express*, *Lord Hood*, *Swallow* and *Nelson*. They travelled at a rate varying from 18⅔ to 25⅘ miles per hour, and a pilot was used on the Milford incline of 1 in 137 "when the trains were heavy." Gauge was 4 ft. 8½ in. and the rails weighed 35 lbs. to the yard and were of the T or single parallel form in 15 ft. lengths set in small chairs 3 ft. apart, either on stone blocks or larch sleepers. The length of line was 19 miles 64 chains and was constructed as a double track. There were various coal-pits on or near the line, viz., at Osmundthorpe (Austhorpe ?), at Manstone, near the present Cross Gate station, and at Garforth and Stutton.

In 1839 the York and North Midland Company secured running powers over the line from Milford Junction, and in October, 1840, it was leased to them for 31 years at an annual rental of £17,000, and by an Act dated May 23rd, 1844, purchased outright for £365,000. The line was eventually extended from Marsh Lane to its present site, known as "New Station" which was opened on April 1st, 1869.

In the beginning of 1841 there were four trains daily each way between Leeds and Selby, all of which called at "York or Old Junction," as well as a midday mail to and from York. On Sundays there were two trains each way and the midday mail. A merchandise train left Leeds at midnight and returned from Selby at 6 a.m. There was also another merchandise train in the course of the evening. The time allowed between the two terminals was one hour for passenger trains and two hours for merchandise trains. The week-day passenger trains ran in connection with the steam packets to and from Hull. The fares for the whole distance were 1st class, 4s. and 2nd class, 3s. The average fare working out at 2¾d. per mile 1st class and 1¾d. per mile 2nd class.

*(To be continued.)*

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# A Railway Veteran Still at the Helm.

## MR. W. D. PHILLIPPS, GENERAL MANAGER, NORTH STAFFORDSHIRE RAILWAY, 1882—1916.

FIFTY years as a member of the Railway Clearing House Goods Managers' Conference, his initial appearance on that body having been as far back as 1866, is the record of Mr. William Douglas Phillipps, General Manager of the North Staffordshire Railway. Very shortly, too, Mr. Phillipps will complete thirty-four years as General Manager of the North Staffordshire Railway, a line which, if not one of the "great" systems of the United Kingdom, is certainly not one of the small lines either in respect of traffic value and volume or in regard to industrial requirements.

As General Manager, Mr. Phillipps thus has to his record the exceptional term of 34 years; a period which has, moreover, witnessed important developments on the North Staffordshire Railway.

Mr. Phillipps carries us back to relatively early days in the history of engineering in the United Kingdom, for he was apprenticed to Scott Russell, builder of Brunel's *Great Eastern* Steamship. Before he was twenty-one Mr. Phillipps was appointed Manager of a mineral railway in South Wales. In 1871 this line was purchased by the Great Western and London and North Western Railways, and Mr. Phillipps became District Manager for the latter at Swansea. A few years later he was appointed Manager of the N.E. district of the London and North Western Railway, with offices at Manchester, and in 1882 acquired his present position. In 1902 he was Chairman of the General Managers' Conference of the Railway Clearing House.

In February, 1899, in the second year of publication of the RAILWAY MAGAZINE, an "Illustrated Interview" with Mr. Phillipps appeared in our pages. Even then, after 17 years as General Manager, Mr. Phillipps had to his record sound progress and development; and now, over 17 years later, the position of the North Staffordshire Railway is a substantial one, and dividends are declared which, if not very large, compare well with those of many of the greater companies.

At this period, too, a further distinction has to be recorded, seeing that during the last few weeks His Majesty the King has conferred upon the Chairman of the North Staffordshire Railway Company, Tonman Mosley, Esq., C.B., a peerage of the United Kingdom, in recognition of his services during this period of national stress.

A few comparisons of statistics of 1882 and 1915 will be of interest. When Mr. Phillipps became Manager in April, 1882, the capital of the North Staffordshire Railway Company was £7,872,190; in 1915 it was £10,975,238. In 1882 there was 196 miles of railway in operation; in 1915 there were 220 miles. The weight of permanent way rails in use in 1882 was 82 lbs. per yd.; in 1915 the standard was 90 lbs. per yd. In 1882 there were 125 locomotives, 334 coaching vehicles and 5,027 wagons; in 1915 the respective figures were 194, 515 and 6,439.

In 1882 the heaviest locomotive in use weighed 57 tons 9 cwt.; in 1915, 86 tons 1 cwt. In 1882 nearly all the wagons were built to carry 6 ton loads only, in fact there were a few 4 ton wagons left. Now the 6 ton wagons have been superseded by 8, 10 and 15 ton wagons. Salaries and wages in 1882 amounted to £176,278; in 1915 to £368,626.

The old third class carriages ran on four wheels, and contained four compartments, while there were corresponding first and second class composites with three compartments only. Now the equivalent vehicles are modern bogie carriages 52 ft. 6 in. long over buffers and with eight third class compartments, or three firsts and four seconds.

In 1882 goods traffic accounted for 1,067,065 tons, and minerals for 2,616,024 tons, total 3,683,089. In 1913, the last year for which detailed statistics are available, the respective totals were 1,765,819 and 5,933,466 tons, aggregating 7,699,285 tons.

The North Staffordshire is unique in that while the total mileage, owned, solely or jointly, or leased or worked, amounts to 220 miles 49 chains, its engines work



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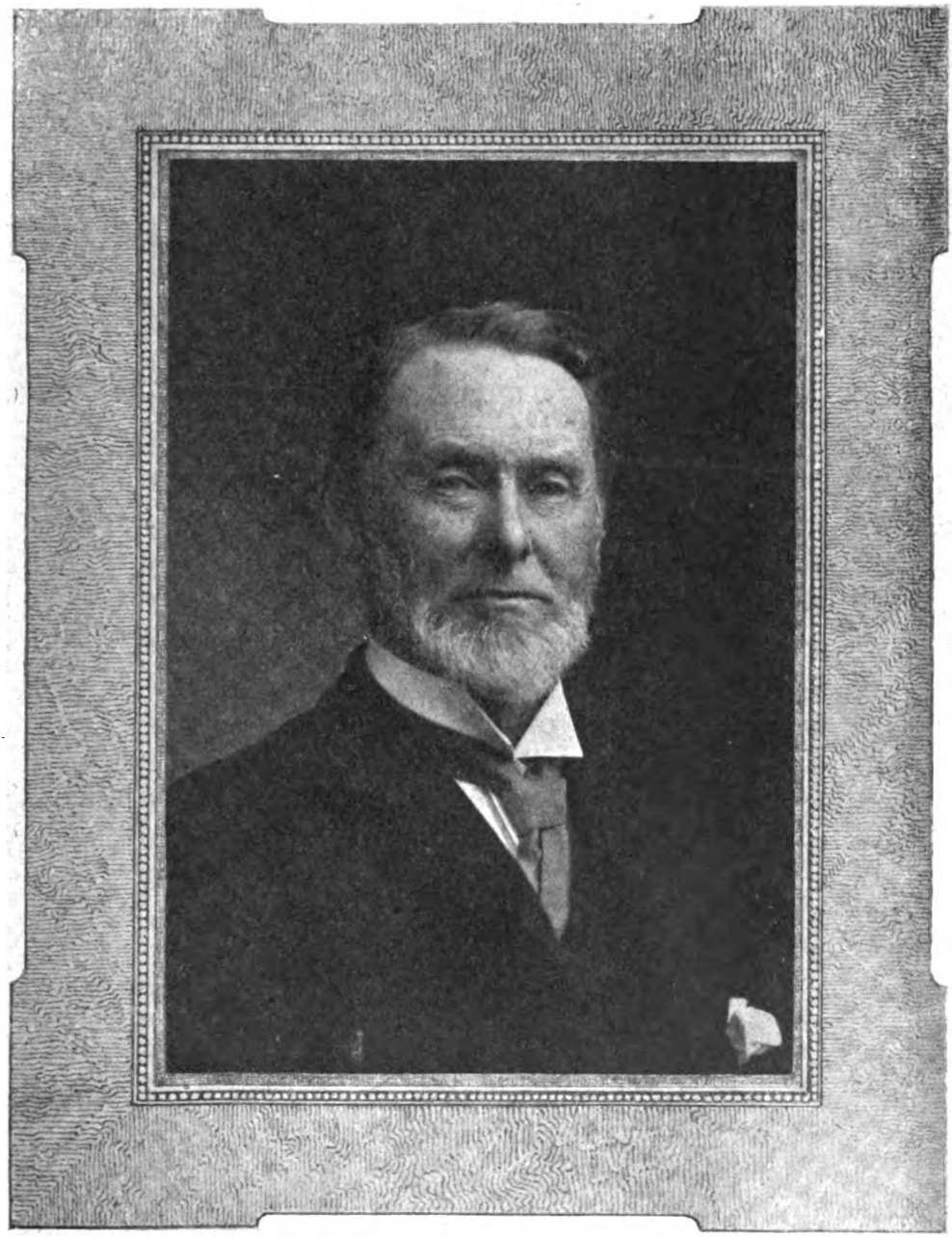

*Photo]* [*Elliott & Fry.*

MR. W. D. PHILLIPPS.

**General Manager: North Staffordshire Railway, 1882–1916.**

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regularly in normal times, over no less than 329 miles of other companies' territory, and occasionally over a further 83½ miles. Indeed, for traffic purposes its engines are to be seen on the North Wales lines of the London and North Western Railway; also at Liverpool, Warrington, Manchester, Buxton, Derby, Nottingham, Rugby, Birmingham, Walsall, Wolverhampton, Wellington, etc., as well as within the limits of the busy "Potteries" area.

As showing the present importance of the North Staffordshire Railway the following statistics may be given, other than those stated above for purposes of comparison.

Receipts in respect of railway working, and of other separate businesses carried on by the Company under the terms of agreement with the Government in respect of the control of railways (1915), £1,153,188.

| | |
|---|---|
| Expenditure .. .. .. | £729,481 |
| Net receipts .. .. .. | £423,707 |
| Miscellaneous receipts (net) .. | £12,403 |
| Total Net Income .. .. | £436,110 |

Mileage owned, 206 miles 25 chains.
Mileage jointly owned, 6 miles 3 chains.
Mileage leased or worked (Leek and Manifold Light Railway), 8 miles 21 chains.

Locomotive stock now includes 5 4–4–0, 5 2–4–0 and 54 0–6–0 tender engines; 8 0–6–4, 7 4–4–2, 51 0–6–0, 28 0–6–2, 8 2–4–2, 20 2–4–0 and 5 0–4–4 tank engines; and three rail motor cars. There are 328 passenger vehicles and 187 other coaching vehicles; and 6,127 wagons. Service vehicles number 379. Road rolling stock includes 3 road motors for goods and parcels and 216 horse wagons and carts. Other activities of the Company include the operation of the Trent and Mersey Navigation Canal—119 miles—in connection with which the introduction of electric haulage through the Harecastle tunnel was fully described, with other examples of electrical enterprise, in an article dealing with the work of the department directed by Mr. A. F. Rock, electrical and telegraph engineer, in our pages in July, 1914. The locomotive works at Stoke-on-Trent received attention in November, 1913. There are also the North Stafford Hotel at Stoke-on-Trent, the Churnet Valley Hotel at Leek, and the Rudyard Hotel at Rudyard; while the limestone quarry at Caldon Low had an output last year of 296,219 tons.

It will therefore be seen that the activities of the North Staffordshire Railway are considerable; from the traffic point of view it ranks as a most important line, and in every way Mr. Phillipps has to his record during his long tenure of office notable development, and the maintenance and improvement of his Company's standing as a sound and prosperous concern.

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# The Liverpool Overhead Railway.

## THE FIRST OVERHEAD ELECTRIC RAILWAY IN THE WORLD.

THIS line, fully described in the RAILWAY MAGAZINE for February, 1901, possesses many features of particular interest, and seeing that some years have passed since it received attention in these pages, some notes based upon a paper contributed to the proceedings of the Liverpool Engineering Society by Mr. E. J. Neachell, M.I.Mech. E., M.I.E.E., Engineer and General Manager since 1908, will be in place.

MR. E. J. NEACHELL,
Engineer and General Manager, Liverpool Overhead Railway.

The history of the scheme is of some interest. As early as 1852 a project of the kind was brought forward. Nothing, however, came of it, but in 1878 it was revived in consequence of the developments, north and south, of the dock system of Liverpool, and the increasing traffic on the dock lines of railway connecting the various goods stations. This traffic impeded the horse-drawn buses which were at that time the principal means of passenger transport along the margin of the dock estate. In that year (1878) Parliamentary powers were obtained by the Mersey Docks and Harbour Board to construct a single-track overhead line along the dock estate for a length, including branches, of 5¼ miles, "to increase and improve the means of access to the various docks on the Liverpool side of the River Mersey." But the Board of Trade would not consent to a single line with



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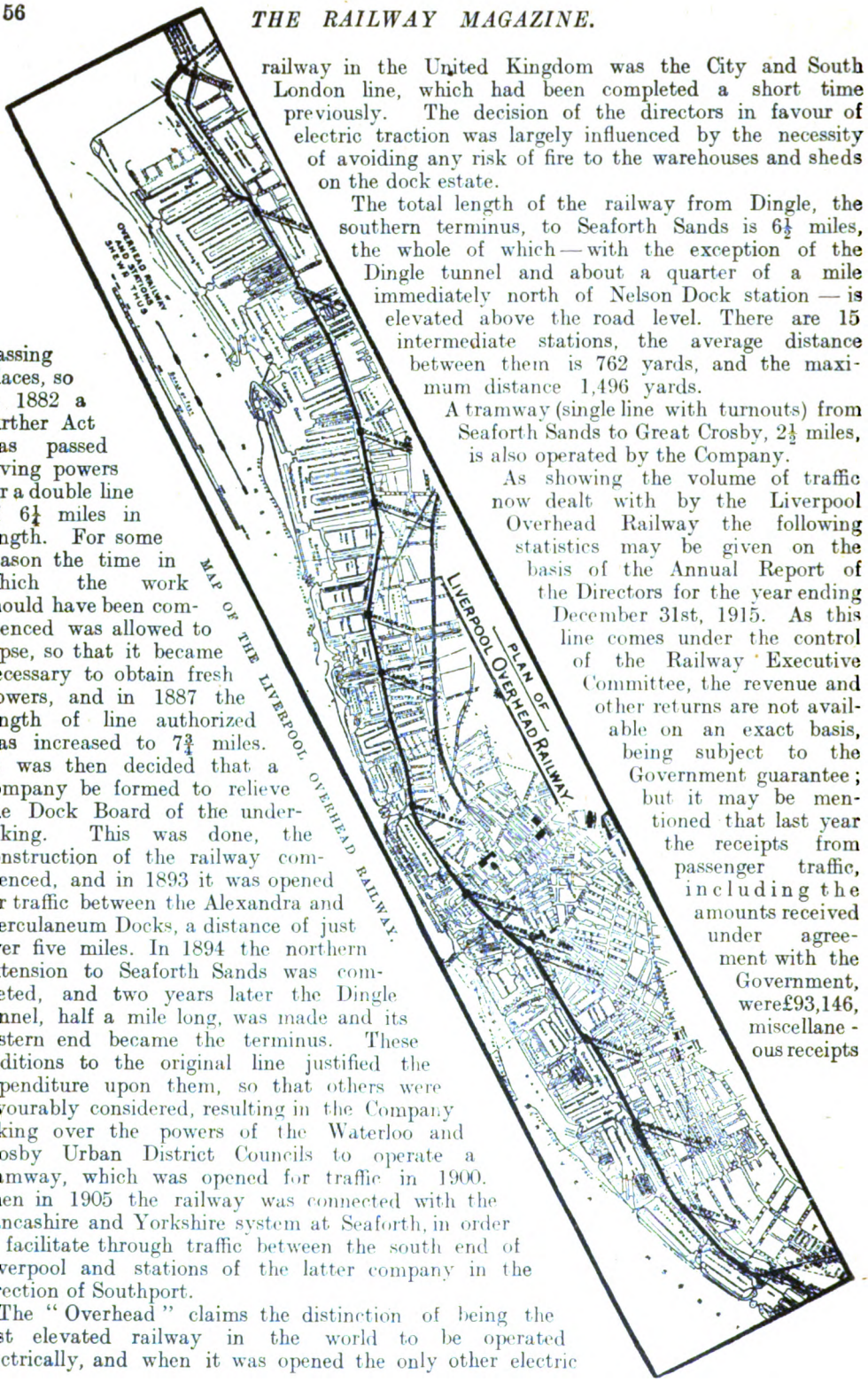


MAP OF THE LIVERPOOL OVERHEAD RAILWAY.

passing places, so in 1882 a further Act was passed giving powers for a double line of 6¼ miles in length. For some reason the time in which the work should have been commenced was allowed to lapse, so that it became necessary to obtain fresh powers, and in 1887 the length of line authorized was increased to 7¾ miles. It was then decided that a company be formed to relieve the Dock Board of the undertaking. This was done, the construction of the railway commenced, and in 1893 it was opened for traffic between the Alexandra and Herculaneum Docks, a distance of just over five miles. In 1894 the northern extension to Seaforth Sands was completed, and two years later the Dingle tunnel, half a mile long, was made and its eastern end became the terminus. These additions to the original line justified the expenditure upon them, so that others were favourably considered, resulting in the Company taking over the powers of the Waterloo and Crosby Urban District Councils to operate a tramway, which was opened for traffic in 1900. Then in 1905 the railway was connected with the Lancashire and Yorkshire system at Seaforth, in order to facilitate through traffic between the south end of Liverpool and stations of the latter company in the direction of Southport.

The "Overhead" claims the distinction of being the first elevated railway in the world to be operated electrically, and when it was opened the only other electric railway in the United Kingdom was the City and South London line, which had been completed a short time previously. The decision of the directors in favour of electric traction was largely influenced by the necessity of avoiding any risk of fire to the warehouses and sheds on the dock estate.

The total length of the railway from Dingle, the southern terminus, to Seaforth Sands is 6½ miles, the whole of which—with the exception of the Dingle tunnel and about a quarter of a mile immediately north of Nelson Dock station—is elevated above the road level. There are 15 intermediate stations, the average distance between them is 762 yards, and the maximum distance 1,496 yards.

A tramway (single line with turnouts) from Seaforth Sands to Great Crosby, 2½ miles, is also operated by the Company.

As showing the volume of traffic now dealt with by the Liverpool Overhead Railway the following statistics may be given on the basis of the Annual Report of the Directors for the year ending December 31st, 1915. As this line comes under the control of the Railway Executive Committee, the revenue and other returns are not available on an exact basis, being subject to the Government guarantee; but it may be mentioned that last year the receipts from passenger traffic, including the amounts received under agreement with the Government, were £93,146, miscellaneous receipts

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£2,085, deducting the working expenses and appropriation to reserve fund, £64,435, there was a balance of £30,796 available to meet the Dividends upon Preference Shares of 5 per cent., with a Dividend for the Ordinary Shares at the rate of 3¼ per cent. for the year, by no means an unsatisfactory record, as railway securities go nowadays, and in view of the conditions prevailing.

Rolling stock includes 44 electric passenger motor cars, 8 trailer cars, two service vehicles, a 0–4–0 steam locomotive for depôt shunting, and 14 tramcars for use on the Crosby tram route. During the year 11,883,598 passengers were conveyed by train, with 3,198,904 on the tramways, total 15,082,502.

Permanent way consists of flat-bottomed steel rails (60 lbs. per yard) laid on longitudinal sleepers, which are held in position by means of lugs rivetted to the flooring plates of the structure.

The wear of the checkrails on the curves and also of the wheel flanges was formerly very excessive, rough surfaces were formed on both, with the result that they cut each other away. Mr. Neachell overcame this trouble by placing a box in the four-foot way, from which grease is forced on to the inside of the flange. A view of this arrangement is reproduced. The box is operated by the train wheels passing over a treadle and each wheel-flange is lubricated once every round trip.

The positive conductor rail, weighing 70 lbs. per yard, is laid in the six-foot way, except at crossover roads and in special places where it is more convenient on the outside of the track. The line is divided into nine sections and switches are placed on the girders at both ends of each section, by which the current can be cut off from either or both rails as required in case of accident.

Direct current at 500 volts pressure is generated at the company's own power station at Bramley Moore Dock, and is transmitted overhead to the conductor rail opposite the power station, and by feeder cables carried alongside the girders to Alexandra Dock, Custom House, Brunswick and Herculaneum Docks. The return is formed by a centre steel rail, weighing 40 lbs. per yard, bonded into the running rails at frequent intervals.

The total output is about 4¾ million units per annum :—

| | |
|---|---|
| For Railway Traction .. | 3½ million units. |
| For the Seaforth and Crosby Trams .. .. | 800,000 units. |
| For Station and Depôt Lighting, and Auxiliary Plant .. .. .. | 450,000 units. |

The signals at the intermediate stations are operated automatically by the collector-shoes on the trains. The automatic signals adopted by the company were worked on the "Timmis" system. They were put to danger mechanically and held in the "off" position electrically, so that in the event of a failure of current all the signals would immediately go to the "danger" position. Improvements were subsequently made and current is taken from the conductor rail for pulling the signals off, and they are then held off mechanically. The collector-shoe in sliding over, and depressing by its own weight, a bar which is connected to the starting signal arm, puts it to danger. It is held in this position by a pawl whilst the train passes to the next station, and the home signal is placed at danger in the same way. Upon the train passing the next "starter" the operation is again repeated, and a switch is closed, so that an electrical circuit through solenoids on the two previous signals is completed, when the collector-shoe strikes another bar a little in advance, and the first starter and the home are then released electrically, leaving the second starter at danger, so that at least one signal is always at the "danger" position behind each train. In addition, all trains are signalled from station to station by bell code and block instrument, and each starting signal is also arranged that if it be passed while in the danger position, a brush carried on the front of the train makes contact with a bar in connection with the signal, completes a circuit which automatically cuts off the current from the motors and causes the Westinghouse brakes to be applied, so that the train is thus brought to a standstill.

All the stations are lighted electrically, current being supplied to them by a separate feeder cable direct from the batteries. Metal filament lamps of 200 candle power are now being used. At certain places where the railway is outside the wall of the dock estate, lighting has to be provided by the Company underneath the structure, and special cables are installed, as the lights are required at night after the train service has ceased and current is cut off the line. At the Stanley Dock, which is the only dock on the east side of the railway, is a swing

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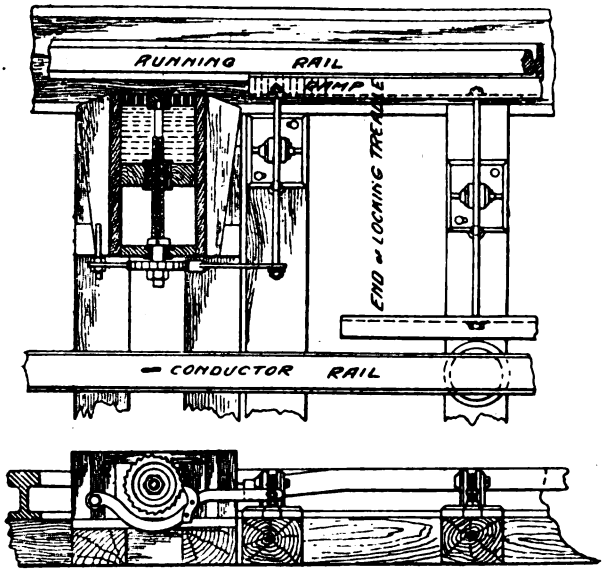


GREASE BOX FIXED TO SLEEPERS BETWEEN RAILS.

bridge, worked hydraulically, which is often opened at night-time to allow vessels to pass in and out, and for the structure lighting at the southern end a cable has been laid across the bottom of the dock, so that current is available when the bridge is open.

Originally all the trains consisted of two composite coaches having seating accommodation for 16 first-class and 40 third-class passengers, and were each equipped with two 60 horse-power motors arranged with series-parallel control. The motors were designed to give a schedule speed, including stops, of 13 miles per hour, thus taking 32 min. for the journey between Seaforth Sands and Dingle. Later some new trains were added, consisting of two third-class motor coaches with a first-class trailer car in between them and the accommodation given was 40 and 106 in the first and third-class compartments respectively. Also a portion of the earlier coaches were reconstructed and enlarged so as to accommodate 26 more passengers each.

In 1901, in order to combat the severe competition brought about by the electrification of the Liverpool Corporation Tramways, it was decided to accelerate the speed of the trains, and the next year the 60 horse-power motors were discarded and the trains re-equipped with 4 geared motors, each of 100 horse-power, having a high rate of acceleration, and the time for the journey was reduced to 22 min. But the power required increased from 110 to 137 watts per ton-mile and raised the coal consumption very considerably, in addition to which the up-keep of the rolling stock, motors, etc., permanent way, and the structure of the railway itself, became a considerable yearly charge, and in 1908 the Directors came to the conclusion that better financial results would be obtained from a slightly lower speed, which would not necessitate so much expenditure either in power or maintenance, and the motors were arranged to run in two sets of two in series instead of all four in parallel. This decreased the schedule speed so that 28 min. are now taken for the journey and a more

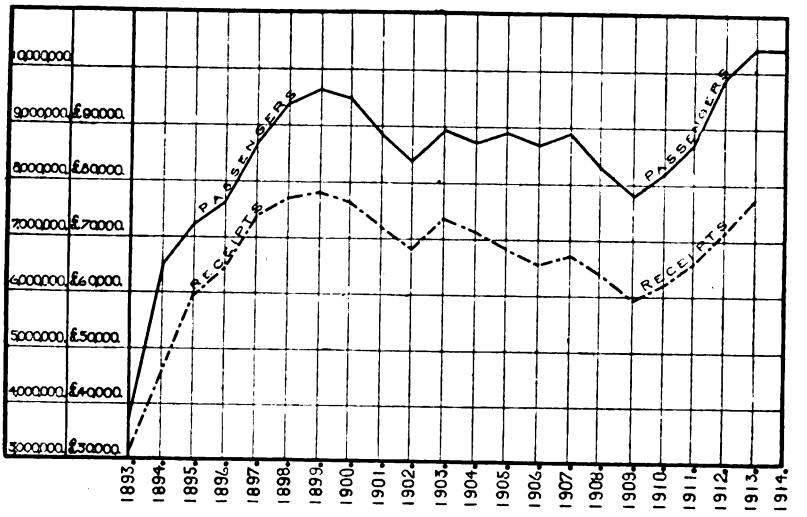


DIAGRAM SHOWING PASSENGERS AND RECEIPTS PER ANNUM, 1893-1914.

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frequent service is maintained at a lower cost.

On week-days the service is operated for 19 hours each day, and on Sundays for 13 hours. The ordinary daily service is 200 trains in each direction, giving an average headway of 5¾ min., but during the times of heaviest traffic, that is, from 6.30 to 7.30 a.m., and between 5 and 6 p.m. the interval between trains is only 3 min. In the evenings and on Sundays a 10 min. service is in operation. During the past five years the average number of train miles run is 845,765.

For 12 years the fares charged were arranged on the "Zone" system, and the number of passengers was checked by means of turnstiles, single journey tickets being issued to first-class passengers only. The single fares were 3d. first-class, and 2d. third-class for any distance, but return tickets at 3d. each were issued to workmen up to 8 a.m. on week-days. This system was economical, but was found to be impracticable when return tickets and through booking to the Lancashire and Yorkshire Railway were commenced. The turnstiles are still in use, but only as barriers, preventing passengers passing on to the platforms without obtaining tickets or joining the trains after starting.

Differential fares were introduced in 1905, also penny stages covering the distance between three stations. These penny fares, however, were not a financial success, and the stages had to be reduced.

A curve is given showing the numbers of passengers carried on the railway from 1893 to 1914, marking a steady increase till 1899, the year so many transports were despatched from Liverpool to South Africa carrying troops for the Boer War. Then the Corporation commenced the electric tram service between Dingle and the City, which, owing to the lower fare, although the time taken on the journey was considerably longer, took traffic away from the railway, and as the extension northwards of the electrified trams continued, so the railway traffic dropped off until the end of 1902, when the accelerated service recovered it for a few years. But after 1907, when the trade of the Port began to decline and the Company raised the workmen's fares, the decrease became more pronounced, until in 1909 the number of passengers carried was only slightly in excess of that of 13 years before. The extra halfpenny which had been added to the fare was taken off, a revival of trade set in, and the traffic increased to 10½ millions, a figure it had never previously reached.

Mr. E. J. Neachell, has been responsible for the management of the line since 1908, besides occupying the position of civil, mechanical and electrical engineer, commenced with the Electric Construction Company, Limited, Wolverhampton, as an apprentice in 1890, and was engaged in the various shops for some years. After that he was engaged on contracts in different parts of the country, including in 1900 the equipment of the new generating station of the City and South London Railway and the changing over of that line to the three-wire system. From 1901 to 1903 Mr. Neachell acted as electrical and mechanical engineer to Messrs. Dick, Kerr and Company, Limited, of London and Preston, and was responsible for the equipment of the Grimsby and Cleethorpes Tramways, Portsmouth Corporation Tramways, Portsdown and Horndean Light Railway, and other installations. In 1903 he joined the Liverpool Overhead Railway as Chief Assistant Engineer, which position he held until his appointment in 1908 as Chief Engineer and General Manager.

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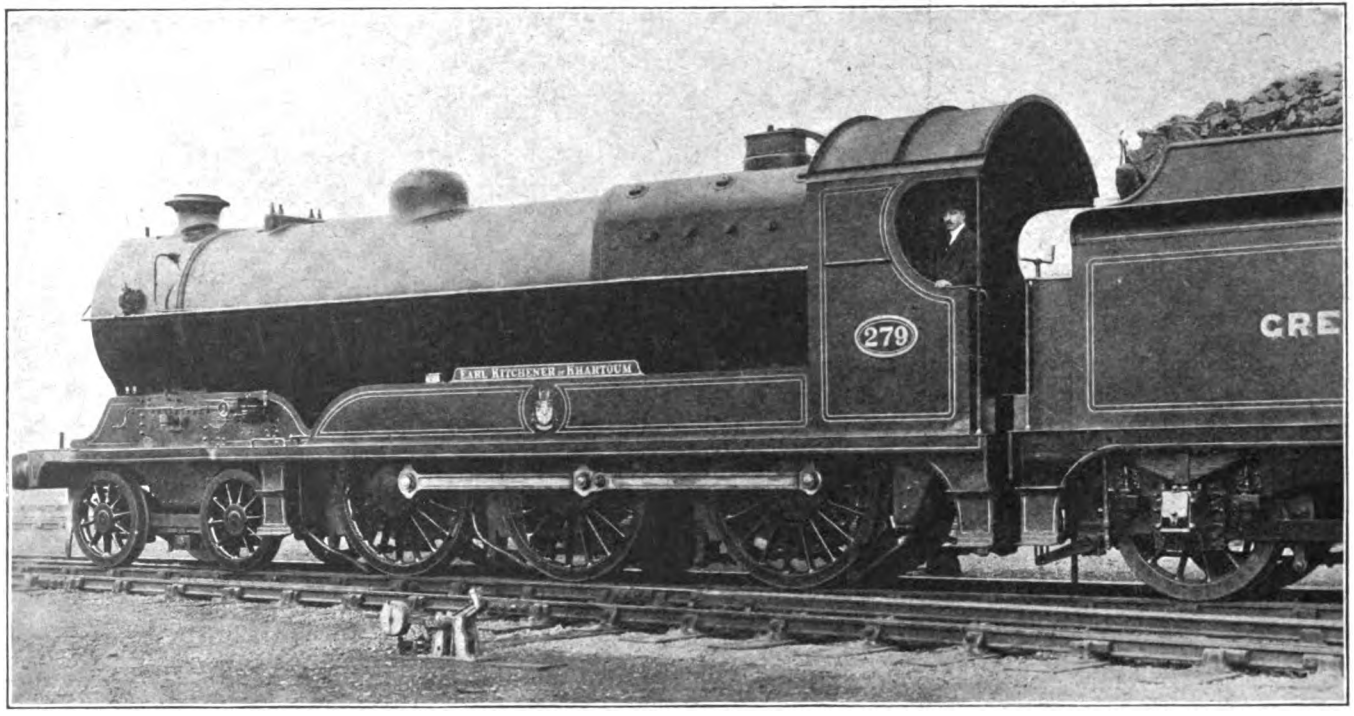
## 4-6-0 Locomotive, No. 279, "EARL KITCHENER OF KHARTOUM," Great Central Railway.




By the courtesy of Mr. A. M. H. Solomon, and with the consent of Mr. J. G. Robinson, Chief Mechanical Engineer, Great Central Railway, we are able to reproduce this notable photograph, taken only a few days before the news of Lord Kitchener's death was made public. The engine is one of Mr. Robinson's latest 4–6–0 mixed-traffic superheater locomotives, with 5 ft. coupled wheels, and in other respects corresponding generally with the well-known and deservedly famous "Sir Sam Fay" class of express engines. In coping with the severe traffic demands incidental to war conditions both classes have proved exceptionally useful, while the engines are great favourites, both with the enginemen and with the travelling public.

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# PERTINENT PARAGRAPHS

### The "Hampshire" Disaster.

FROM the general point of view there is no need for us to refer in detail to the sinking of the *Hampshire* whereby the nation has lost its great military head, Lord Kitchener, together with at least two leading engineers. No one can forget what Lord Kitchener did as to railway communication in the Sudan, which not only contributed to the defeat of Madhi-ism but provided that country with a railway service which is now also a valuable asset. On his retirement from active service Lord Kitchener was for some months a Director of the London, Chatham and Dover Railway and a member of the South Eastern and Chatham Joint Managing Committee, but on his resuming public responsibilities necessarily withdrew.

Amongst the members of Lord Kitchener's staff were two associated with British railways, Sir Hay Frederick Donaldson was last year appointed Technical Adviser to the Minister of Munitions. At the time of the transfer he was chief superintendent of the Royal Arsenal Factories at Woolwich, which post he had held for twelve years. His earlier experience as an engineer was gained in railway work on the London and North Western system and in India. He was resident engineer during the construction of the Manchester Ship Canal, and afterwards chief engineer to the London and India Docks Committee. Mr. Leslie S. Robertson was a distinguished engineer, who joined the Ministry of Munitions when the department was set up. He was a member of the firm of Robertson and Outram, Consulting Engineers, 28, Victoria Street, S.W., and has been largely concerned in the work of the Engineering Standards Committees, which have done so much to systematise engineering. He was a director of a number of companies and was largely associated with the development of superheating apparatus for locomotives, being Chairman of the Schmidt Superheating Co., Ltd., until he took up public responsibilities.

### Royal Birthday Honours.

SEVERAL well-known railway men received royal recognition of services rendered in connection with the Birthday Honours this year. A Barony of the United Kingdom was conferred upon Mr. Tonman Mosley, C.B., one of the best-known figures in Buckinghamshire, where he is Chairman of the County Council and of the Territorial Association. He is prominent in Staffordshire and Derbyshire as Chairman of the North Staffordshire Railway Company and as a Director of the Grand Junction Canal Company.

Mr. E. C. Geddes, who receives the honour of Knighthood, has been Deputy-Director-General of Munitions Supply since the formation of the Ministry. To our readers he is well known as the Deputy General Manager of the North Eastern Railway. He was temporarily released by the Company from his duties in June of last year. Born in Scotland, when quite young he went with his parents to the United States, and served on the Baltimore and Ohio Railway. Then he went out to India to manage a 40 miles steam tramway running north from Shahjahanpur, with the additional charge of the development of a large tract of forest and cultivable land through which the tramway is laid. When the Powayan steam tramway was taken over for working by the Lucknow-Bareilly State Railway, Mr. Geddes was appointed traffic manager of the Rohilkund and Kumaon Railway system, including the Lucknow-Bareilly State Railway and branches. This post he held until October, 1904, when he came to England and joined the North Eastern Railway as claims agent, and subsequently commercial agent, a new office of American origin which he introduced to British railway working. In 1906 he was appointed Chief Goods Manager of the North Eastern Railway, and some years later was promoted to the post of Deputy General Manager.

Mr. Edward Nicholl, a Cardiff shipowner, and a Director of the Taff Vale Railway and other industrial companies, is made a Knight. In the Colonial Office list Mr. Archibald Samuel Cooper, General Manager of the Nigerian Railway, is made C.M.G. of the Order of St. Michael and St. George. Mr. R. Swan Highet becomes a Knight of the Order of the Indian Empire. He joined the service of the East Indian Railway as an assistant engineer in 1883 at the age of twenty-four. In 1894 he was appointed personal assistant to the late Mr. F. E. Robertson, C.I.E., then chief engineer; and in 1896 was placed in charge of the Asansol district of the railway. He officiated as deputy chief engineer in 1902, and was appointed chief engineer in May, 1903. In December, 1912, he succeeded the late Sir William Dring as Agent of the East Indian Railway, a position which he still fills.

### Naval Ambulance Train Exhibition at Addison Road.

HITHERTO all ambulance trains placed upon public exhibition have been designed for the



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conveyance of wounded soldiers either at home or abroad. There are, however, several which are adapted more particularly for naval purposes, and these also possess features of interest, and include certain modifications. By the courtesy of the Lords Commissioners of the Admiralty a naval ambulance train, equipped by the London and North Western Railway, was on view at Kensington (Addison Road) station on Whit-Sunday and Whit-Monday, June 11th and 12th, from 10 a.m. to 8 p.m. The train was shown fully equipped and staffed in exactly the condition in which it is used for the conveyance of sailors and marines on arrival from the Fleet. The charge for admission was 1s., the proceeds being devoted to the welfare of the sick and wounded naval ratings under treatment in the Dreadnought Seamen's Hospital, Greenwich.

A standard naval ambulance train consists of twelve vehicles arranged in the following order: A coach for baggage and guard, a staff coach, dining car, cot coach for officers, three cot coaches for patients, a store coach and kitchen, day coach for patients, two cot coaches for patients, and a crew coach and guard. The length of the train is about 620 ft., and the width is generally 8 ft. 6 in., while the weight is about 310 tons. It is painted externally "Navy Grey," with a red Geneva Cross on each vehicle in a conspicuous place, while internally enamelled white paint prevails. All internal ironwork and interior of gangways is painted with aluminium paint. Both vacuum and Westinghouse brakes are fitted, as the train travels over various companies' systems. The train has living accommodation for a permanent crew of thirty-eight sick berth staff all in charge of a medical officer, who has his living quarters in the staff coach, while 140 sick and wounded are accommodated in six cot coaches.

The patients are accommodated in the same class of cot that is used on board ship, and these are taken directly from the ship and suspended from hooks in the roof of the cot coaches, and are further secured in position by chains and springs known as gripes, which prevent them from swinging when the train is in motion.

## Common User of Railway Wagons on Scottish Railways.

REFERENCE has already been made to the arrangements for common user of wagons entered into by the Great Central, Great Eastern, and Great Northern Companies in December last, and by the London and North Western, Great Western, Midland, North Eastern, and Lancashire and Yorkshire in April, while it has also been suggested that further developments were probable in respect of the Scottish companies.

It has been definitely decided by the Caledonian, Glasgow and South Western, and North British Railways to use open goods and mineral wagons as common user stock for the purposes of the three Companies. Wagons which will not be included in the arrangement are the following:—

*Goods Wagons.* — Six and eight-wheeled wagons; special class wagons, *i.e.*, bar iron, caravan, cart, cask, floorcloth, swivel bar, trolley, twin, furniture, gondola, implement, pulley, rail, tank, frame, tube, well.

*Mineral Wagons.* — Coke wagons, hopper wagons, pig-iron wagons, wagons plated to carry more than 16 tons, North British wagons lettered for the following firms: A. and G. Anderson (Barblues), Coltness Iron Company (Hassockrigg), Robert Forrestier & Co., Niddrie Collieries, James Nimmo & Co.

Common user wagons other than a few owned by the North British Railway and stencilled "Local Use Only," may be loaded from any station on the systems of the partner Companies to any station in Scotland or England; but they should by preference be loaded to the parent line or in the direction of the system of the owning company, when this can be done without additional shunting or when the wagons are as accessible as other common user wagons.

In regard to docks, harbours, collieries, and works served by two of the Companies, or by all three Companies, each Company (unless otherwise arranged) supplies wagons for traffic passing to its own line or to places beyond and traders are advised to use wagons for the traffic of the railway which supplies them. Other wagons owned by the three Companies, including the exceptions referred to above, and the whole of the stock belonging to other railway companies, are dealt with in accordance with the usual arrangements. Companies which are not included in the new arrangement must return to the three railways concerned the wagons owned by them as is the case to-day. Sheets and ropes are not included in the arrangement.

## Keadby Deviation and Rolling Lift Bridge, Great Central Railway.

ONE of the most important engineering works of the period is that which has now been completed by the Great Central Railway at Keadby, on the route from Sheffield to Grimsby *via* Doncaster, Thorne and Frodingham, a section which already carried very heavy traffic, and which, with the opening of Immingham Dock and the further extension of mineral and other traffic to Immingham and Grimsby, has become of special importance. The old bridge, which dates from 1863, was of swing type, and crossed the River Trent about 200 ft. away from the new structure. In connection with the erection of a new bridge a length of deviation railway had, of course, to be built, and in conjunction therewith the two stations at Althorpe and Gunness and Burringham (about half a mile apart) are replaced by a new one conveniently located for both districts, known as Althorpe (for Keadby and Gunness and Burringham). The old bridge was devoted only to railway traffic, but the local authorities have contributed towards the cost of the new one, which combines a roadway with the two-track railway crossing. The new bridge crosses the River Trent about 14 miles north of Gainsborough, and consists of five spans, the principal feature of which is an

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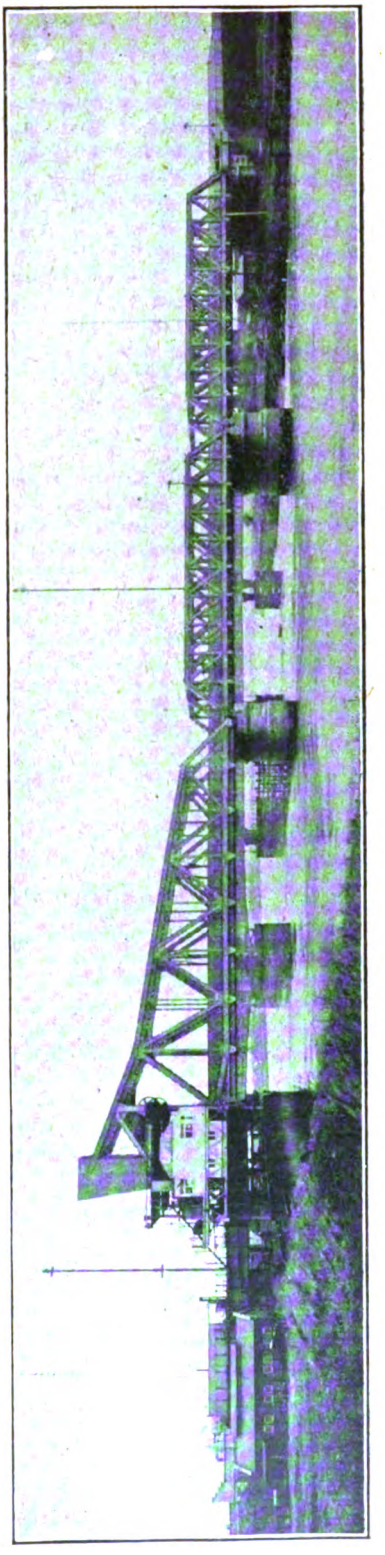
electrically-operated lifting span of the Scherzer rolling lift type. It carries a public highway in addition to the railway, and the lifting span has the distinction of being the heaviest bridge of its type yet constructed in Europe, having a mass weight of approximately 3,000 tons. There are only two or three other bridges in the United Kingdom of this type, and these are considerably smaller than that at Keadby. The public highway has a width of 24 ft., and the railway a width of 26 ft.; the two fixed river spans have each a span of 140 ft., and are of lattice girder construction; the two remaining spans on the eastern side are 70 ft. and 40 ft. spans respectively. A great improvement has been effected in the width of the navigable river channel by the construction of the new bridge over that provided by the old swing bridge, which it replaces. The width of the waterway in the case of the new bridge is 150 ft. clear; in the case of the old bridge the width of the waterways were 60 ft. each on either side of the centre dolphin upon which the swing span turned. The work was carried out by Messrs. Sir William Arrol & Co., Ltd., of Glasgow, to the designs of Mr. J. B. Ball, M.Inst.C.E., Chief Engineer, Great Central Railway.



ROLLING-LIFT BRIDGE (SCHERZER TYPE) ON KEADBY DEVIATION: GREAT CENTRAL RAILWAY.

**Three-Position Signals.**

In view of the fact that the bridge introduced certain traffic problems and that over a mile of new line was involved, opportunity has been taken to give upper-quadrant three-position signalling a thorough trial. Therefore, this section provides the first main line installation of upper quadrant signals, and the first of any magnitude to incorporate three-position working with British practice. Indeed, there is only one solitary signal at present in service, outside Paddington station, Great Western Railway, and the Keadby installation ranks as the first to cover a section of line.

For the signalling the British Pneumatic Railway Signal Co., Ltd., have been responsible. In conjunction with the use of upper quadrant arms and three-position principles, the equipment at Keadby includes several features of interest.

Four signal cabins are involved: Keadby Junction, at one end of the new section, with ordinary mechanical signals, controlled and in some degree inter-working with the three-position installation; Keadby Canal East Box at the actual commencement of the deviation line; the Bridge Box; and Gunhouse Junction Box at the other end of the deviation. Keadby Bridge Box is erected on the north side of the new bridge. The distances between the boxes principally concerned are:—

| | Miles. | Yards. |
|---|---|---|
| Keadby Canal East to Keadby Bridge .. | 1 | 307 |
| Keadby Bridge to Gunhouse Junction .. | 0 | 1,757 |

There are eight three-position signals. The caution indication is given at night by a yellow light. The arms of the three-position signals are

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replaced at "danger" immediately a train passes them by means of track circuits installed on the up line from Keadby Canal East up starting signal, right through to Gunhouse Junction up starting signal, and on the down line from 300 yards east of Gunhouse Junction down outer home signal right through to a point opposite Keadby Canal East Box.

There are two sand drags, each approximately 110 yards long, one to safeguard approach to the bridge on each line. Before the bridge can be opened for river traffic facing points must be set for the sand drags. Telephones are provided at suitable signals, and a driver finding a signal at "danger," if detained longer than 3 min., is required to communicate with the signalman at the Bridge Box, unless he can see that the bridge is raised.

### The London and North Western Railway and the men of the *Tara*.

THE Directors of the London and North Western Railway recently entertained the rescued crew of H.M. Armed Cruiser *Tara*, which, it will be remembered, was formerly the company's s.s. *Hibernia*, and was torpedoed in the Eastern Mediterranean on November 5th last. The majority of the crew were fortunately saved and managed to land on the North African coast, beyond the Egyptian Frontier, and after a long period of great privation and suffering in the Libyan Desert, were rescued by the brilliant motor car raid carried out under the command of the Duke of Westminster.

That the London and North Western Railway did things well is shown by the programme of the day's arrangements, as follows :—

Special Train—
Holyhead .. .. depart 6.45 a.m.
Euston .. .. .. arrive 12. 8 noon
(Breakfast served on the train).
Luncheon at Euston Hotel (East Wing) .. .. .. .. 1. 0 p.m.
Omnibuses leave Euston Hotel for London Coliseum .. .. 2. 0 p.m.
Return from London Coliseum after performance to Euston Station, tea served in the Dining Room (No. 9 platform) 6.0 p.m.
Special Train—
Euston .. .. .. depart 7.15 p.m.
Holyhead .. .. arrive 12.38 a.m.
(Supper served on train).

At the Coliseum a lantern slide was thrown on to the screen announcing that the rescued officers and crew of the *Tara*, which was torpedoed in the Mediterranean in November, 1915, were present, and accorded them a welcome. A portrait was also shown of the Duke of Westminster, who rescued the party from the hands of the Senussi in March last.

### Sir Gilbert Claughton's Welcome.

AT the luncheon, Sir Gilbert Claughton, Chairman, addressed the visitors, and the following extract from his speech may be quoted: "Our delight at now having the opportunity of meeting you after all the privations which you have undergone is, I assure you, a very great one indeed. Alas! all the ship's company are not with us to-day, but of the invalids Quartermaster Abbitt, Boatswain T. Owen, and Steward E. Evans, we have good reports, and the memory of those others whom we shall never see again will, I am sure, be a very sacred one, both to you and to us. But, gentlemen, there is another absentee to-day, and that is the Duke of Westminster. I am perfectly certain it would have been a great pleasure for you to have seen him here, and I am equally certain it would have been a great pleasure for him to see you all to-day, because of all that happened on the last occasion of your meeting; but he sends me a telegram: 'Mind you give my kindest greetings to all the men, and mind you give them snails for a remembrance.' Let me also at this moment, if I may, read an extract from a letter from Colonel Holland:

> I wish I could be there also to greet the men after their terrible sufferings, from the effects of which, I trust, they have now recovered, and to express my deep sympathy with the families of those who have fallen. Will you please tell 'all hands' from me that I never doubted but that the officers and men, who throughout the years they were under my command always gave loyal and devoted service to the Company, would 'quit themselves like men' in that of their country when the hour of trial came; that I think of our association in the past with pride and pleasure, and look forward to the time when, the war being over, I may be with them again."

Captain Williams, the naval officer in command of the *Tara*, and Captain Tanner, the North Western officer on board the steamer, suitably responded. Mr. Guy Calthrop, General Manager, and the Chief Officers of the Company, were present.

### The Summer-Time Act.

ROYAL Assent having been given, an official notice was issued by the Home Secretary and posted at all railway stations announcing the alteration of time in the following terms :—

"In the night of Saturday-Sunday, May 20th and 21st, at 2 a.m., the time on all railways, at all Post Offices and other Government establishments, will be put forward one hour to 3 a.m. The altered time will be used for all ordinary purposes during the summer. For instance, licensed houses, factories and workshops, and other establishments where hours are regulated by law will be required to observe the altered time. The Government requests the public to put forward all clocks and watches by one hour during the night of Saturday, May 20th. Normal time will be restored at 2 a.m. on the night of Saturday-Sunday, September 30th-October 1st. The chief object of this measure at the present time is to reduce the number of hours during which artificial lighting is used in the evenings, and so save to the nation part of the fuel and oil for lighting, and release large quantities of coal

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which are urgently needed for other purposes arising from the war."

The change was made with little or no inconvenience, but for the night in question most of the railways had to issue notices on their own account in regard to trains which started before 2 o'clock and would not complete their journey by the time the clocks were altered. The following announcement, made by the Great Western Railway, is typical:—

"Trains starting on Saturday night, May 20th, or early on Sunday morning, May 21st, which are *en route* at 2 a.m., when the clocks are advanced one hour, will after that time be running *one hour later* than the times given in the time-tables; and branch trains starting after 2 a.m., running in connection with such trains, will also run correspondingly later."

## Charing Cross Railway Bridge.

THE Marquis of Bristol's Select Committee of the House of Lords considered the bill promoted by the South Eastern and London, Chatham and Dover Railways for the purpose of strengthening Charing Cross Bridge to enable it to carry without danger modern heavy traffic. The bill had to meet considerable opposition but after several days had been occupied in hearing evidence, the preamble was declared to be "proved." The petitioners against the bill were the Gas Light and Coke Company, the Port of London Authority, the Association of Master Lightermen and Bargeowners of the Port of London, and the London County Council. For the Railway Company, Mr. Clode, K.C., explained that the strengthening of the bridge had become imperative, but the widening for which powers were obtained some years ago, had become superlative because the traffic had not increased owing to the competition of motors and trams. Under the present bill the Company would be able to accommodate the traffic by the four lines of the original bridge, and the three lines added in 1882. In view of the loads entailed by modern traffic, the engineer had had to impose a very drastic restriction, that not more than two lines must be used at the same time for locomotives, and these two lines must never be adjacent lines.

The bridge would be strengthened by cantilever brackets, which would take the strain from the cross girders. The original proposal for widening would have cost over £741,000, but the proposed strengthening would cost £167,000, so that there would be a saving of half a million of money. The spans would be 139 ft., with a headway of 25 ft., so that the bridge compared most favourably with other bridges. The spans were longer and the headway greater than any of the bridges towards Wandsworth, so that it was not easy to understand the objection of the Gas Company whose vessels had to pass under these bridges.

Reference was then made to the idea prevalent in some quarters that the proposal was to pull down the present bridge and to build another, and the further suggestion that the time was opportune for removing Charing Cross station to the Surrey side, and building a new highway bridge at Charing Cross.

## Engineering Evidence.

MR. P. C. TEMPEST, Chief Engineer, South Eastern and Chatham Railway, gave evidence and was followed by Mr. Chas. L. Morgan, Chief Engineer, London, Brighton and South Coast Railway, who agreed that the strengthening of the bridge was imperative, the principal question being that of the moving load. An important feature both from the point of view of avoidance of risk and for the convenience of the travelling public was that the use of the bridge could go on exactly as now during the progress of the work. As a strengthening scheme he could conceive of nothing better. Mr. Basil Mott, the engineer responsible for the widening of Blackfriars Bridge—now the widest road-bridge over the Thames—and many other important works, said the present scheme was the best that could be devised.

Sir Francis Dent, General Manager, stated that the present proposals would provide accommodation for many years. As to the scheme of the London County Council—which was constantly cropping up—for the removal of Charing Cross station to the Surrey side of the river, it would mean a great sacrifice on the part of the people left on the Surrey side. He believed counsel was correct in saying that one of the reasons for taking the trams over Westminster Bridge was that people had to walk over the bridge in all weathers. But, apart from all other questions, Charing Cross was an ideal site for a railway station. The London County Council had never put forward any definite plans to support their suggestion. He had seen some picturesque things; but the London County Council had not gone into the cost minutely.

## The Opposition.

THE case for the opposition was then commenced, the objections of the gas companies being taken first. Various steamer and tug captains referred to difficulties of navigation, though it was difficult to follow many of their arguments seeing that several adjacent bridges involve considerably less headway and reduced water spaces between piers. Mr. Hall Blyth, Past President, Institution of Civil Engineers, said that he would shut down the traffic and reconstruct the bridge. Mr. Maurice Fitzmaurice, Past President, Institution of Civil Engineers, and builder of Vauxhall Bridge, said the proposed masonry piers would diminish the water space for navigation. There would be no difficulty in reconstructing the bridge, but the traffic would have to be stopped. Mr. Godfrey Earle, secretary to the Office of Works, was called by the Committee to give the Government view on the proposals. He said he had considered the matter from both the economical and æsthetical aspects,



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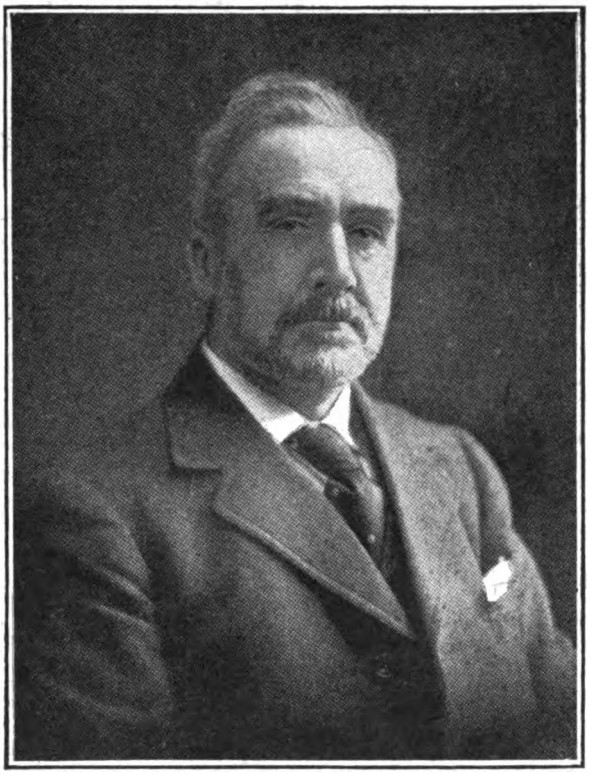
and his view was that the alteration proposed added to the ugliness of the present bridge. He counselled delay from the point of view of national expenditure and also from the aspect of wide public interest. After the war there would be an enormous increase in traffic on this system, with probably a Channel tunnel, and he thought Charing Cross at present was not equal to it.

### Death of Mr. T. W. Pettigrew, General Superintendent, Caledonian Railway.

We regret to hear of the death of Mr. T. W. Pettigrew, General Superintendent, Caledonian Railway. For nearly fifty years Mr. Pettigrew had been in the service, most of that period being spent in the department of which since 1908 he had been the chief. Mr. Pettigrew began his railway career with the Portpatrick Railway in 1867. On March 11th, 1868, he entered the office of the General Superintendent of the Caledonian Railway as confidential clerk to the late Mr. Ward. For five years, from May, 1877, Mr. Pettigrew was stationmaster at Wemyss Bay. Returning to the Superintendent's office in Glasgow as chief clerk, he continued to serve in that capacity until in 1903 he was promoted outdoor assistant to the head of the department. He became Superintendent in 1908.



THE LATE MR. T. W. PETTIGREW,
Superintendent of the Line, Caledonian Railway.

During his long period of service he witnessed many important extensions of the Caledonian Railway. As a member of a special committee Mr. Pettigrew had a considerable share in the preparation of the rules and regulations for the safe working of railways which are now in general use over the railways of the United Kingdom. He introduced on the Caledonian Railway certain modifications of these rules and regulations which have been found beneficial for traffic working.

Mr. Killin, hitherto Assistant General Superintendent, has been appointed to take charge of the department, as recorded on another page.

### New Control Offices, North British Railway.

On Sunday evening, May 14th, the train control office at Portobello, was closed, and a new control office forming part of the District Traffic Superintendent's office at Edinburgh was opened simultaneously, designated "Central Control." The area of this control has been extended to include the lines north and west to Dalmeny and Ratho, the Kirkliston, South Queensferry, and Corstorphine branches. The control apparatus in the new control office consists of a large diagram or plan of all the lines in the area, and the movements and location of the trains therein are represented by pegs and tickets bearing the engine numbers which fall to be removed from point to point, in keeping with the reported movements of the trains from signal-cabins, etc. The train controllers on each shift of duty have each a defined section or part of the area to attend to; and the telephone connections at the several points in each section are so led up to the desks of the controllers as to confine to each all the connections with his own particular section. The sections are: Portobello Yard, South Leith, North Leith, and Granton branches. Waverley to Longniddry; Musselburgh, Lothian lines, Smeaton and Gifford branches. Dalmeny and Ratho to Falahill *vid* Suburban, including Kirkliston and Corstorphine branches; Roslin, Polton, and Penicuik branches.

### Control Telephone Equipment.

A number of the telephone circuits used in the control are led direct into the control office; while the majority are led into an exchange board at Portobello, connected through to the control office by means of trunk wires between the exchange board and the control office. The manner of obtaining attention from the control office is the same in every case whether on wires

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direct or through the exchange. Each instrument that can be used for communicating with the control office is fitted with an additional or special call key for ringing up the control or exchange office; and a short pressure of this key suffices, as thereby the indicator in the control or exchange room drops and remains down till answered. The control exchange is used only for obtaining connection with the control office, and is, therefore, reserved exclusively for telephone communications to and from that office. Instead of only local goods and mineral trains being controlled as hitherto, all goods and mineral trains touching on the control area fall to come under the control arrangements. In the case of special trains which start their day's work in the Fife, Northern, Central, or Southern districts and work into the control area, the control office must be advised from the starting point of the departure time, engine number, destination, home station of engines and men, load, and time driver and guard came on duty.

### Metropolitan Railway War Service Corps.

A STIRRING circular has been issued by Mr. R. H. Selbie, General Manager of the Metropolitan Railway, which makes a vigorous appeal to those of the staff, men and women alike, who are only too ready to "do their bit" in the War, although left at home. For this purpose "The Metropolitan Railway War Service Corps" has been formed. The choice of work is comprehensive enough to suit all concerned, there being seven sections, including helping in munition work at the Neasden Government Factory, and elsewhere, the formation of a Hospital Entertaining Party, a Red Cross Society, and also a Women's Work Scheme. The section formed, which in the coming summer days will probably most appeal to lovers of the open-air, is proposal No. 5, for the cultivation of a market garden on the Company's ground at Wembley Park, for growing food-stuffs for distribution to Naval and Military Hospitals. Work has already been started there.

### History Repeats Itself!

ON May 18th, at the Shipley station of the Great Northern Railway, a goods train coming from Bradford got out of hand on the incline towards Shipley and crashed through the buffer stops and the boundary wall, on to the Leeds Road, where it overturned. The grade is about 1 in 60 for 2½ miles. In Mr. Ahron's interesting articles, when dealing with the Great Northern section, reference was made to a very similar accident at the same place and which occurred in 1885. On that occasion a six-coupled saddle tank engine working a goods train got out of control on the incline with similar results; this time the engine was also a 0–6–0 saddle tank engine!

### "Information Required."

IN reply to H. G. C.'s query given last month, and which is further dealt with on another page of this issue, E. S. S. writes: "These engines were Sharp, Roberts & Co.'s singles and were converted to tank engines by Mr. Ramsbottom. One, No. 446, had been No. 146 on the Southern Division list, and was built in 1847. Cylinders, 15 in. by 20 in.; leading and trailing wheels, 3 ft. 6 in.; drivers, 5 ft. 6 in.; wheel base, 12 ft. 9 in.; boiler, 10 ft. long, 3 ft. 6 in. diameter; heating surface, 768 ft. No. 402 was also of this class. I have outline drawings of two engines of this class, and also a photo of one on a local train in Manchester district about 35 years ago."

### Flash-light Signals.

THE Finland and Danish State Railways have decided to use flash-lights on the "Aga" principle for their distant signals, and have placed orders for a considerable number of installations. The Norwegian State Railway has also been considering for some time entire reorganisation of their signalling system, and have decided to use flash-light in the new system to a large extent. In Russia flash-light is rapidly finding favour, and orders have been received by the "Aga" Company for a considerable number of installations. The important railway between Petrograd and Moscow will shortly have a large portion of its line completely equipped with flash-light signals, and the Moscow-Casan, Alexander, Northern, and several more railways have a considerable number of signals equipped with flash-light, or will shortly do so. Altogether the impression gained is that within a few years most railways in Russia will have gone over to flash-light.

The use of flashing lights as a means of differentiating "caution" from stop indications, in place of the still somewhat questionable yellow light, on lines other than those of a local character, is receiving considerable attention in the United States. Moreover, the "Aga" Company are now able to equip their flash-light installations so that a steady light may be given in some positions and flash-light in others, thus making a very flexible application possible. In the United States, with the automatic block signals, the tendency seems to be to apply flash-light in the "normal" position either for "normal danger" or "normal clear."

If three-position signals come into general use in Great Britain, red must, of course, be retained for signalling "stop"; and green for signalling "clear." For "caution" the choice is between yellow or some other colour, and the suggestion is that only white, or a special variety thereof, such as "lunar white," would really be considered in competition with yellow. If white should be chosen and flash-light used for this indication to avoid a mistake with other lights, there remains to decide if the "stop" or the "clear" indication, or possibly both of them, also should be made flashing, or if one of them should be with steady light.

### Great Western Railway Locomotive No. 95.

MR. J. S. LEWIS, of Ruabon, writes in reference to a request for information concerning a small

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Great Western Railway 0–4–0 saddle tank engine No. 95, as mentioned on page 454 of the June number. He remarks: "No. 95 was originally built in January, 1857, by Sharp, Stewart & Co. (Makers' No. 1026) for the Chester and Birkenhead Railway, on which line it was numbered and named 6 *Cricket*. It had 14 in. by 18 in. cylinders, coupled wheels 4 ft. 0 in., and heating surface 662 sq. ft. It was rebuilt at Wolverhampton in 1890, with short chimney and low dome to enable it to work through a tunnel near the Westminster Colliery, Wrexham. At a later date wheels of 3 ft. 6 in. diameter replaced the original ones, and a new cab and standard chimney added. This engine, together with a somewhat similar one (No. 92) are occasionally leased to the different collieries in North Wales for shunting purposes, and No. 95 was rather badly damaged on September 2nd, 1912, when it ran off the line while shunting at the Wynnstay Collieries, Ruabon."

### Unusual Locomotive and Train Working in War Time.

READERS continue to inform us of instances noted by them of engines and rolling stock appearing in unusual places due to the conditions of traffic working brought about by the war. Mr. Niven mentions Great Central goods engines (in one case with a South Eastern and Chatham and a Caledonian brake van) at Ibrox, Glasgow and Paisley Joint Line. The same engine was also seen at Govan, while a North Eastern goods engine was observed at Cardonald.

Mr. J. Macartney-Robbins mentions some unusual locomotives seen on the West London Extension line during the last three or four months.

(*a*) Great Western Railway No. 3,390 *Wolverhampton*, 4–4–0, on special train loaded with furniture vans, at Addison Road.

(*b*) London, Brighton and South Coast Railway No. 217, 0–4–2, waiting for troop train at Addison Road.

(*c*) London, Brighton and South Coast Railway No. 25, 4–4–2T superheater, and London and North Western Railway 0–6–0, No. 2,313 on troop train at Addison Road.

(*d*) London, Brighton and South Coast Railway No. 83, 4–4–2T superheater on troop train at Addison Road.

(*e*) South Eastern and Chatham Railway 4–4–0, old Stirling class, at Addison Road.

(*f*) Great Northern Railway No. 183, 0–6–0, Stirling goods on troop train composed of North British Railway stock at Willesden High Level.

(*g*) Midland Railway (L.T.S.S.) No. 2,144, 4–4–2T, on refugee special for West Brompton.

(*h*) Great Eastern Railway, two 0–6–0's at Addison Road.

We have ourselves noted at this station several London and North Western and South Eastern and Chatham main line engines; also a Great Northern superheater 0–6–0 engine on a train of Great Central coaches, taken on by South Eastern and Chatham 4–4–0 engine No. 516.

### Underground Efficiency Meeting.

AT a recent Operating Department Efficiency Meeting held at the London General Omnibus Company Training School, Milman's Street, Chelsea, S.W., a paper on "The Graphic Presentation of Operating Data" was read by Mr. H. E. Beech, of the London General Omnibus Company General Superintendent's Department. The chair was occupied by Mr. H. E. Blain, the Operating Manager, who said that the past two years had been notable for the very great improvement which had been effected in the graphs and diagrams used in the department which had enabled the huge mass of Operating Data to be presented in a form at once easy to comprehend and clear in exposition.

Mr. Beech's Paper was illustrated by slides commencing with some of the striking posters which have been utilised to show the various speed rates of different types of vehicles used in London transit. The subject was divided into sections:—(1) Curves; (2) Vertical Diagrams; (3) Describers; (4) Other graphical methods. Included in the first group were examples of bus loading diagrams, charts showing Mess Room operations, the movement of employees at Woolwich Arsenal with the traffic facilities afforded, quarterly route averages in successive years and progressive averages on new routes; rotary railway charts, bus petrol consumption charts and train and bus deceleration curves. Group No. 2 included traffic analysis loading diagrams of several descriptions, accident diagrams, diagrams showing journeys per head of population of large cities and comparison of rapid transit facilities. Group No. 3 showed some novel forms of describers which had been perfected for such work as the allocation of vehicles from a large number of garages to different routes. Group No. 4 included several different types of diagrams for plotting and checking headways, graphs showing comparison of vehicles used in different years, combined cartoons showing routes geographically with loadings on bus and railway facilities in the area, etc. The actual forms from which the illustrations had been prepared were laid out as exhibits.

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# WHAT THE RAILWAYS ARE DOING

A NEW series of 0–8–0 mineral engines (Schmidt superheater) recently put in hand at Crewe is now being turned out as follows:—Nos. 170, 545, 885, 942, 982, 1167, 1217, 1528, 1729 and 2288. They are fitted with the vacuum brake throughout, and also with the pump for maintaining the vacuum whilst running. No. 1959 *Revenge*, which was recently converted from a four-cylinder compound to two-cylinder simple ("Renown" class), has been sent to Northampton (No. 5) shed. A further two 5 ft. compound goods engines ("1400" class) have been withdrawn, Nos. 511 and 695. Only four of these engines now remain in service. No. 791, 4 ft. 6 in. passenger tank, has had the condensing apparatus removed; also the steam brake, being now fitted with the vacuum brake throughout. Since the withdrawal of the dining car service, the 5.55 and 6.5 p.m. trains from Euston have been combined to Crewe, leaving the London termini at 6.5 p.m., excepting on Fridays, when the train is divided and the old times reverted to. When combined, the train is timed to reach Crewe at 8.55 p.m., the Liverpool portion going forward at 9.0, and the Manchester portion at 9.5.

* * *

MR. J. A. RADLEY, District Engineer, Northern division, Great Eastern Railway, has retired on account of ill-health. He entered the service in March, 1884, as assistant at Lowestoft Harbour, and in January, 1888, was appointed to the position which he held up to the time of his retirement. At a luncheon given by the Officers of the Company at the Liverpool Street Hotel, Mr. Radley was presented with a silver salver and a gold repeater watch. Mr. H. W. Thornton, General Manager, made the presentation and spoke in very happy terms of Mr. Radley's service. Mr. H. Wilmer, Chief Civil Engineer, referred to Mr. Radley's unfailing fidelity, and many well-deserved compliments were paid by other officers. In acknowledging the presentation and also the kindness of his reception, Mr. Radley referred to the disastrous floods of 1912, and expressed appreciation of the assistance then rendered by his colleagues, more especially Mr. Wilmer—then District Engineer of the Southern division—who performed a good and exceptionally quick piece of work in rebuilding the three-span bridge between Forncett and Flordon.

* * *

FOLLOWING the lead of other companies, in order to alleviate the difficulties incidental to the situation, the Great Central Railway have, at Sheffield, introduced female labour for engine cleaning; also as goods porters. The women engaged at the engine depôts earn £1 for a week of fifty-three hours, and their working suits are provided. These suits, consisting of trouser overalls, coat, and cap in dark blue "galatea" are workman-like, and amply protective from grease and dirt. A spacious messroom with whitewashed walls has been provided for the use of the women only. Most of the women are wives or widows of soldiers. At the Bridgehouses depôt, Sheffield, the women engaged as goods porters are paid at the same rate as the men. Here, too, is a large messroom with whitewashed walls, a cheerful stove, and water laid on. But the work being less dirty than in the engine sheds, overalls are not provided. There are nearly 100 women goods porters at the Bridgehouses depôt, and with the exception of half-a-dozen, are the wives or widows of soldiers.

* * *

THE orchestra of the Great Eastern Railway Musical Society paid another visit to the convalescent camp at Woodcote Park, Epsom, on Sunday, May 7th. It was evident that the favourable impression they had made on the previous occasion had not been forgotten, as the concert was again attended by an audience which filled the hall in every part. Miss Annie Bartle, soprano, and Miss Nellie Walker, contralto, rendered appropriate vocal selections, and harp solos were skilfully played by Miss K. L. Wilson. Colonel Galloway conducted with great watchfulness and skill. At the conclusion Lord Killanin (Hon. Sec. of the Local Recreation Committee) warmly thanked the Society. Colonel Galloway, in response, mentioned that all the performers were busily engaged on important work at home, and that if their duties did not permit them to go to the other side they readily devoted what spare time they might have to entertaining those in Arms and felt themselves well repaid by the evident enjoyment they had afforded.

* * *

A CONCERT, arranged by the staff of Messrs. D. Napier & Son, Ltd., in aid of the Star and Garter Fund, and held at Hammersmith Baths, was an unqualified success, realising well over £100. All monies received for admission, programmes, etc., were handed over without any deduction whatever, to the Star and Garter Fund, all expenses being borne by Messrs. Napier. The programme was an interesting one, including some of the best talent in the country. To select special items—where all did so well—



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is almost invidious, but special reference may be made to the excellent turns provided by Miss Elizabeth Asquith, Miss Gertrude Kingston, Miss Clarice Mayne and "That," Miss Annie Rees, Mr. Billy Merson, and "Maurice." The entertainment given by these artistes, who attended at some inconvenience to themselves, were received very enthusiastically by the Napier Staff, who were present to the number of over 1,400.

* * *

AT Star Level Crossing, Pulham Market, Great Eastern Railway, the nine-year old daughter of Platelayer Alger noticed that the gates were across the railway though a ballast train was approaching at speed. As there was no time to warn her parents in the gate-cottage, she at once ran towards the gates, succeeded in opening one of them, and was in the act of opening the other when the engine dashed into it, smashing it and knocking the child over. Fortunately her injuries were not serious. Recently, the little girl, accompanied by her mother, travelled to Liverpool Street in order that the Great Eastern Chairman, Lord Claud Hamilton, might present her with a gold wristlet watch bearing the words: "Alice R. E. Alger, from the Directors of the G.E. Railway Co.—For Bravery.—May, 1916." Lord Claud presented her, in addition, with a small case of needlework utensils as a personal gift from himself.

* * *

MR. E. MOODY writes: "With reference to the paragraph on page 455 of your June issue, wherein it is stated: 'It is believed to be over 30 years since a South Western engine was seen north of Templecombe prior to Easter Monday,' it may interest your readers to know that London and South Western locomotives may frequently be seen on the Midland and South Western Junction Railway. I saw one last December as far north as Cirencester on a Red Cross train. The London and South Western and Midland Companies have been regularly running their locomotives over the Midland and South Western Junction line since the war and a Great Western 0-6-0 tender goods locomotive was borrowed some time back for shunting in the Swindon Town yard."

* * *

IN order to overcome some of the difficulties of the present situation, several Scottish railways are sending engines for repair to English railway works, or to private firms. Thus the Yorkshire Engine Company, of Sheffield, recently repaired two 4-4-0 tender and two 0-4-4 and one 0-6-0 tank engines for the Caledonian Railway. One of Mr. Jones' 4-6-0 goods engines, Highland Railway, has received attention at the works of Messrs. Stephenson & Co., Ltd., Darlington; while No. 107 of the same class was overhauled by Messrs. Hawthorn, Leslie & Co., of Newcastle. Mr. P. Drummond's small 4-4-0 express engine No. 17, *Ben Alligan*, was repaired at the Darlington works of the North Eastern Railway.

As the producers of beautiful colour pictures for railway carriage decoration the Photochrom Company, Ltd., Old Bailey, London, E.C., has a great reputation among well-travelled people. There is, however, another side to the firm's activities. Naval, as well as railway affairs, claim a share of its attention and, what is of much moment, coming immediately after the British victory off the Jutland coast, a naval series of twenty-four colour posteards entitled "Britain Prepared," depicting the Grand Fleet at work in the North Sea, has just been produced by permission of H.M. Admiralty. Readers who desire fuller particulars should write Mr. Lambert, the courteous managing director of the Photochrom Company, Ltd., and mention the RAILWAY MAGAZINE.

* * *

DURING the past few months new tea-rooms have been opened at Ipswich, Ely and Colchester, while others are in hand. At Liverpool Street, Great Eastern Railway, in order to meet increased demand, an additional room has been erected on the west side, adjacent to the original tea-room on the bridge and connected with it over the public stairway. In order to comply with a popular desire, smoking is permitted in the new room. The old tea-room has been redecorated and refurnished in similar style to the new one.

* * *

ONE of the further ambulance trains equipped by the Great Eastern Railway at their Stratford Works for the use of the Army in France, was on view at Liverpool Street station, platform No. 1, from 7.30 a.m. until 4.15 p.m. on Thursday and Friday, May 25th and 26th, and again on Sunday, May 28th, from 8.0 a.m. until 8.0 p.m. Tickets, 6d., were issued at the booking office on the station. Amounts realised were, as in other cases, given to the fund for providing comforts for the Railway Troops serving with the Army in France.

* * *

AN interesting ceremony took place recently at Liverpool Central station, when Mr. George Wilkins, who has retired from the position of goods agent from the Cheshire Lines Committee's Birkenhead (Shore Road) station, was the recipient of a presentation from the heads of executive departments and the leading agents and stationmasters on the system. The presentation was made by Mr. John E. Charnley, Manager, who referred to the long service—forty-two years—Mr. Wilkins had given to the Committee.

* * *

A BEXHILL reader, Mr. K. Paton, mentions that sevefal of Mr. James Stirling's 7 ft. 4-4-0 engines on the South Eastern and Chatham Railway are being rebuilt a second time with extended smokeboxes. Engines so far altered include Nos. 87, 133, 153, 197, 215, 250, 448 and 451. On the London, Brighton and South Coast Railway the large "Canada" class of 4-4-0's are being rebuilt with extended smokeboxes. Nos. 47, 50, 53 and 60 have been thus altered.

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A SOMEWHAT novel method has been adopted by the Great Eastern Railway to obviate any risk of passengers alighting through a signal stop occurring at any of the stations which are now closed. Wooden structures carrying boards bearing in large letters the words "Station Closed," have been erected on the platforms, many having two faces placed angularly, so as to be clearly visible from either direction.

* * *

THE Great Eastern Railway District Goods Manager, Cambridge, Mr. E. Robinson, late of Manchester, has been for many years a member of the Royal Agricultural Society of England, and since taking up his present appointment has become a member of the Cambridge and Isle of Ely Agricultural Society and also the Cambridge and Isle of Ely Chamber of Agriculture.

* * *

THE exhibition of London and North Western Railway ambulance vehicles at Broad Street station, London, on Friday, May 5th, realised £115 2s. In addition to this, £15 6s. 3d. was contributed in the collection boxes on the train, and Dog "Brum" collected £4 7s. The total sum of £134 15s. 3d. has been given to the fund for providing comforts for the railway troops (R.E.) serving with the Expeditionary Forces.

* * *

AMONGST the announcements in the *Gazette* of June 2nd is that of the promotion to the rank of captain of Lieut. L. W. S. Grinling, the only son of Mr. W. J. Grinling, Chief Traffic Manager, Great Northern Railway. Capt. Grinling, who prior to the war was in the service of the South Eastern and Chatham Railway, has been in France since October, 1914, on the staff of the railway transport establishment.

* * *

A SUCCESSFUL trial train was run on a recent Sunday on the newly electrified line between Broad Street and Richmond, North London and London and North Western Railways. This foreshadows the introduction of regular electrical working on this route, and announcements to this effect may be expected very shortly.

* * *

MR. J. E. WILLIAMS, General Secretary of the National Union of Railwaymen, has tendered his resignation of the office, on account of ill-health, and has expressed his intention of vacating his position at the close of this year. Mr. Williams has acted for 25 years as branch secretary, and for 14 years as a head office official.

* * *

ON Monday, June 12th, a "halt," known as Carterhatch Lane (Enfield Highway), was opened for traffic between Churchbury and Forty Hill, Great Eastern Railway. This is on the route between Lower Edmonton and Cheshunt, at present worked by a motor train.

* * *

THE Directors of the North British Railway have appointed Mr. Richard Brown, Audit Accountant, as successor to the late Mr. John Sinclair.

SINCE Monday, June 5th, the service of trains between Kensington (Addison Road) and Richmond, provided by the London and South Western Railway, has been suspended. The stations at Shepherd's Bush and Hammersmith (The Grove) and the London and South Western platforms at Ravenscourt Park and Turnham Green stations are closed for the time being.

* * *

THE Directors of the North Eastern Railway have elected Mr. Arthur Scholefield, of Lint Close, Alnmouth, Northumberland, to be a Director in place of the late Viscount Ridley.

* * *

WE regret to hear of the death of Mr. Herbert Rake, one of the oldest contributors to the pages of the RAILWAY MAGAZINE. Mr. Rake was for a considerable time prior to his death bed-ridden and entirely incapacitated. His historical articles have always constituted a leading feature of our pages; but a great deal of the material he had collected will still be available, and the work is being continued by Mr. H. H. Meik, who latterly collaborated with Mr. Rake.

* * *

WITH regard to the assistance given by the Canadian Government to the Grand Trunk Pacific Railway and the Canadian Northern Railway by means of 6 per cent. loans aggregating respectively $8,000,000 and $15,000,000, payable on demand and secured by mortgage on the property of each of the companies concerned, it is officially stated that the loan to the Grand Trunk Pacific Railway Company is to meet interest for at least a year upon the securities of the Company, to meet deficit in operations and to purchase rolling stock. The loan to the Canadian Northern Railway is "to be used for expenditure made or to meet indebtedness incurred in paying interest upon securities of the companies included in the Canadian Northern Railway system, having priority over the securities guaranteed by the Government under the legislation of 1914, and instalments of principal for equipment securities and upon construction." The whole loan is to be secured by a mortgage upon the undertaking of the Canadian Northern Railway, and so much of the loan as is applied for the benefit of any company included in the Canadian Northern Railway system, is to be secured by an additional mortgage upon the undertaking of such subsidiary corporation. The mortgages are to contain terms and conditions approved by the Governor-in-Council.

* * *

WE regret to record the death of Mr. J. J. Hill, sometimes referred to as the great railway builder, at his home in St. Paul, Minnesota. Mr. Hill was associated with Lord Mount-Stephen, Lord Strathcona and others, in the creation and development of the St Paul, Minneapolis and Manitoba Railway. He became General Manager of that road, and in time succeeded Lord Mount-Stephen as its President.

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Under the title of the Great Northern he carried that system to the Pacific, and finding the Northern Pacific under receivership a great obstacle, he and his old friends combined to acquire a controlling amount of that company's stock. Under his management the Northern Pacific came to be scarcely less prosperous than the Great Northern. Mr. Hill was one of the group which undertook the Canadian Pacific contract, but he soon withdrew from that undertaking and gave his whole efforts up to the road of which he was president.

* * *

NOT only will Canada possess the world's biggest bridge in the new Quebec Bridge, but it claims the longest and highest viaduct. This is the Lethbridge Viaduct, which the Canadian Pacific Railway recently completed across the Belly River at Lethbridge, Southern Alberta. The structure is 5,327 ft. in length, and 307 ft. in height. There are 44 plate-girder spans 67 ft. long, 22 plate-girder spans 99 ft. long, and one riveted-deck lattice span 167 ft. long, the whole being carried on 33 rigidly braced riveted steel towers. The substructure consists of concrete piles supporting concrete pedestals, the length of the piles varying from 12 ft. to 20 ft. The design chosen for the Lethbridge Viaduct was selected because, considering the great height of the structure and the difficulty of erecting false-work owing to the prevailing high winds in Southern Alberta, it could be comparatively easily constructed.

* * *

REPRESENTATIVES of the Russian Government have secured an option on the Canadian Car and Foundry Company's plant at Fort William, Ontario, the intention being, if a purchase is effected, to remove it to Russia. The purchase would include the entire plant, buildings, and machinery, and everything used in the construction, particularly the steel work, with the exception of the concrete, brick and hollow tile work, together with the machinery, would be removed to Russia and re-erected there. Russia is short of railway rolling stock, and to partly supply the deficiency has, since war began, ordered 20,000 freight cars in the United States and 2,000 in Canada, delivery of which is being made in knock down form at Vladivostock, where it is to be erected. The Russian Government wants shops there for erection purposes and also for building rolling stock.

* * *

A FOLDER has just been published by the Grand Trunk Railway, dealing with Alaska. It contains a mass of useful information, numerous pictures and an up-to-date map of British Columbia, Alaska and Yukon, showing the new Grand Trunk Pacific Steamship Service *vid* Prince Rupert to Alaska. Very little concerning Alaska is known on this side, and the folder will enable travellers to glean useful knowledge before arriving there. Copies can be had at the Grand Trunk Railway offices, 17–19, Cockspur Street, London, S.W.

* * *

MR. GEORGE BURY, Vice-President of the Canadian Pacific Railway, recently announced in a special circular, that two free scholarships covering four years' tuition in the Faculty of Applied Science in McGill University, were being offered to apprentices and other employés enrolled on the permanent staff of the company, and under 21 years of age, and to minor sons of employés. The scholarships would be awarded as the results of competitive examination.

* * *

AN aerial scenic tramway 1,800 ft. long, built exclusively for transporting passengers across the Whirlpool, has been almost completed at Niagara Falls, Ontario. It is one of the longest, and probably the safest, aerial cableways in the world. The only other installation of its kind is at San Sebastian, Spain, where tourists are transported across a gorge, from a trolley terminus to an otherwise inaccessible view-place and casino overlooking the Bay of Biscay.

* * *

THROUGH the Crown Agents for the Colonies 100 ten-ton end tipping coal cars have been ordered for the Nigerian Railways from the Canadian Car and Foundry Company. They are built to a typical design of European equipment, of four-wheel rigid wheelbase types, with end and side doors. They are to be shipped with underframe in one package, and the sides and ends crated.

* * *

THE first steel sleeping cars ever built in Canada arrived at Moncton, New Brunswick, on May 13th, being the first portion of a supply ordered for the Canadian Government Railways from Hamilton, Ontario.

* * *

THE Canadian Pacific Railway has technical schools attached to its great shops, and at Trail the company has developed a great chemical and metallurgical laboratory and hydro-electric equipment.

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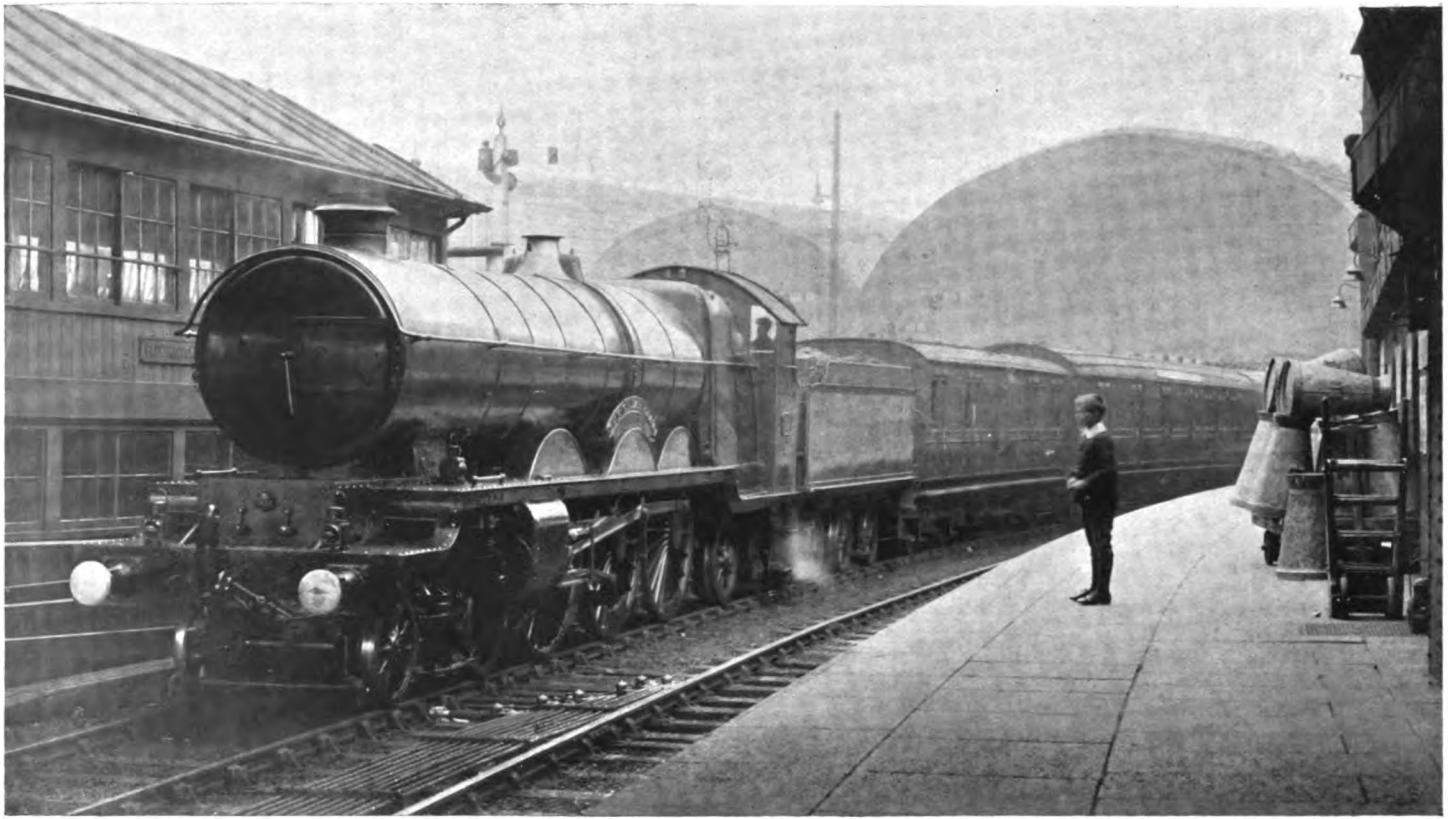

*Photo]* [*F. E. Mackay.*

## GREAT WESTERN RAILWAY.

**6.30 p.m. Plymouth Dining Car Express leaving Paddington Station, London, hauled by "Pacific" type Locomotive, No. 111, "The Great Bear."**

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GREAT NORTHERN RAILWAY VEGETABLE SIDINGS AT BOSTON.

# Railways and the Nation's Industries.

## THE LINCOLNSHIRE POTATO TRAFFIC.

By CHARLES DIX.

**[Trade aspects of traffic problems are now receiving special attention, and while in a measure the remarks made in this article apply mainly to normal conditions, certain of the author's comments are pertinent to the present situation. Therefore not only as showing how one of the lesser known food industries of the United Kingdom is dealt with, but also on the wide basis of national policy, this article is of peculiar importance.—Ed. R.M.]**

PREVIOUS articles under the above general heading have appeared in the RAILWAY MAGAZINE demonstrating in some measure the important and essential part played by the railway in the extension of existing industries, and in the creation and development of new industrial interests and prosperous trading communities. Whatever criticisms may arise in connection with railway policy and management, the fact remains that by the constructive development of its property, combined with reasonable, and frequently liberal, assistance and concession to trade and industry, the country's business has been enormously extended and enlarged, and the railway has justified its position as a ruling factor in the national life.

The potato traffic of Lincolnshire has been chosen as the subject of the present article because, for one thing, it illustrates the effect of intelligent co-operation between the railway and the trader in the building up of industries and trading communities. The district itself is peculiarly adapted to the cultivation of the potato, and this natural adaptability has been greatly enhanced by scientific methods of culture and organisation, with the result that the supplementary development of a huge railway traffic has in a couple of decades converted a countryside very largely consisting of marsh and wild pasture land, into the potato garden of England.

The potato industry flourishes practically throughout the county, but the district particularly under review in the present article is that South-East section of Lincolnshire, lying round the Wash between Boston and Holbeach and embracing Spalding and the surrounding villages, of which the most important in this connection is Littleworth.

This district is served by the East Lincolnshire line of the Great Northern Railway,



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running from Peterborough to Grimsby and passing through Littleworth, Spalding, Kirton (another important "potato" centre), and Boston, which for traffic purposes may be regarded as the Clearing House of the northern section of the district. At Spalding, the clearing centre of the southern section of the district, the Midland and Great Northern Railway branches off through Holbeach and Long Sutton to Lynn and Cromer.

Within this area many thousands of acres of land are under potato cultivation, and not the least interesting fact is the rapidity with which this has been accomplished. Some 30 years ago the man who farmed 5 acres of potato-land was accounted a person of some

POTATO WAREHOUSE ADJOINING LITTLEWORTH STATION.
Showing light railway and motor wagons.

substance, whereas now farms of upwards of 1,000 acres are not uncommon; many more consist of 100 to 400 acres; and there are scores of growers with farms ranging from 10 to 100 acres. And it must be borne in mind that the dominating factor in the prosperity resulting from this remarkable industrial development is the railway, which has acted as "foster-mother," studying the requirements, providing the facilities, setting the struggling offspring on its feet and, in very practical fashion, helping it on its way to the position it occupies in the industrial and economic world to-day.

Messrs. Dennis & Sons are the largest growers in the district, farming in all something like 7,000 acres. Of these over 2,000 acres are situated in the parish of Kirton, near Boston, with a similar area in the neighbourhood of Littleworth; and it is perhaps to this firm more than any other individual influence that the development of the industry from the farmers' point of view, is due.

Commencing in a small way, the father of the present members of the firm realised the necessity for improved methods of culture, and rigidly adhered to his own precept. This is usually quoted as—"plough deep, till the soil, plant good seed, manure liberally, but first get the water off your land"—and gradually the small farm worked by spade and fork has been transformed into large and ever-increasing estates of thousands of acres. Machinery has taken the place of hand labour in preparing the land, planting the seed, and reaping the harvest; scientific analysis of the soil has been followed by modern intensive culture, producing results which seem incredible when compared with those obtainable under the old system of casual tillage and manuring. Under the old system a crop of 100 tons was considered an exceptional yield from land which under present conditions will readily produce 1,000 tons of potatoes.

There are two seasons in the potato industry, the "new" season during July and

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August, and the "old," lasting from September to April, and in connection with the former, every effort has been concentrated on getting an "early" potato on the market. For this purpose long lines of huge glass-houses have been constructed in which the seed potatoes are germinated in thousands of shallow boxes and made ready for planting out at the first sign of suitable weather conditions, and as many as 1,500 tons are being prepared in this way at a time.

Another interesting development in connection with Messrs. Dennis & Sons' estates is the institution of a system of Light Railways. The estates are split up into sections somewhat on the principle followed by the great American wheat farms, and the Light Railway not only forms the means of transit for produce and material upon the estate itself, but conveys the labourers to and from their work. More important still, it links up with the Great Northern Railway, thus providing a rapid and effective means of collection, delivery and distribution.

There are some 20 miles of these Light Railways, which are supported by motor cars as a means of communication between the various sections of the estates. These in turn are supplemented by 15 to 20 miles of telephone; the whole representing an enlightened system of organisation and control which, aided by science and scientific method, provides a practical demonstration of agricultural development which must undoubtedly leave its impression upon rural England.

More than 50,000 tons of potatoes are handled annually by Messrs. Dennis & Sons, and in addition to supplying the home markets, enormous quantities are despatched abroad, a weekly consignment of 1,000 tons passing through the London Docks alone during the season.

The chief difficulty in the early days of the potato-growing industry was, of course, the question of transit—the problem of getting the potatoes from the land to the market. The centres of the industry being, as in fact they are still, merely hamlets or villages, situated in many cases a considerable distance from the railway, it will readily be understood that the small wayside stations serving the district could not provide the accommodation and facilities required by a traffic which had reached such enormous proportions in so short a time. Perhaps even more acute was the question of cartage, of getting the traffic from the land to the railway, this practically involving the creation as well as the development of cartage services before the potatoes could be placed on rail for transit to the market. It was in this connection that the railway first came to the assistance of the industry.

Special concessions were granted to the growers, under which generous allowances were made to cover the cost of carting the potatoes to the railway station; and, thus

CHITTING HOUSE AND LIGHT RAILWAY.

This building accommodates 200–250 tons of seed potatoes.

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subsidised, the industry rapidly provided itself with carts and teams sufficient to meet even the growing requirements of the traffic. This accomplished, the railway encouraged the organisation and centralisation of the traffic for the more effective competition in the various markets of the country. Exceptionally low rates were put into operation for consignments in bulk, and with the institution of "four and five ton" rates, special train facilities were provided. These have been continually improved upon and added to, and now represent one of the most important factors in the phenomenal development of this Lincolnshire industry.

*Photo]* [*S. Jepson.*

POTATOES (LOOSE AND IN SACKS) FOR DESPATCH FROM A LINCOLNSHIRE STATION.

As previously indicated, the two great railway centres of the district are Boston and Spalding, and, generally speaking, the traffic is worked into these two stations, where it is sorted out and marshalled for distribution all over the country. The wagons, which are loaded up at the country stations, are picked up by passing goods trains, and in the northern section of the district, from such stations as Sibsey and Kirton, are worked into Boston, where also many hundreds of tons of potatoes are handed in direct, being carted to the station by growers in the neighbourhood. Similarly in the southern section of the district the traffic loaded at Littleworth, Deeping and adjacent stations is collected at Spalding and dealt with in the same way. At Spalding, too, the potato traffic from Long Sutton, Holbeach and other adjoining Midland and Great Northern Joint stations, is received every day from the Joint Line, adding a further 80 or 90 wagon-loads to the huge mass, which represents in all a daily traffic of something like 1,000 tons of potatoes.

As already stated, the potato industry has two distinct seasons, the first or "new" season representing one of the principal features in the development of the industry from a traffic point of view, inasmuch as the production of an "early" potato in immense quantities has had to be met by the provision of exceptional transit facilities. During July and August, therefore, a series of special trains is operated, these continuing to run until the end of the year. By this means the traffic, collected at Boston and Spalding for the purpose, is worked direct to all the large market centres and to the chief ports, including London, for export abroad.

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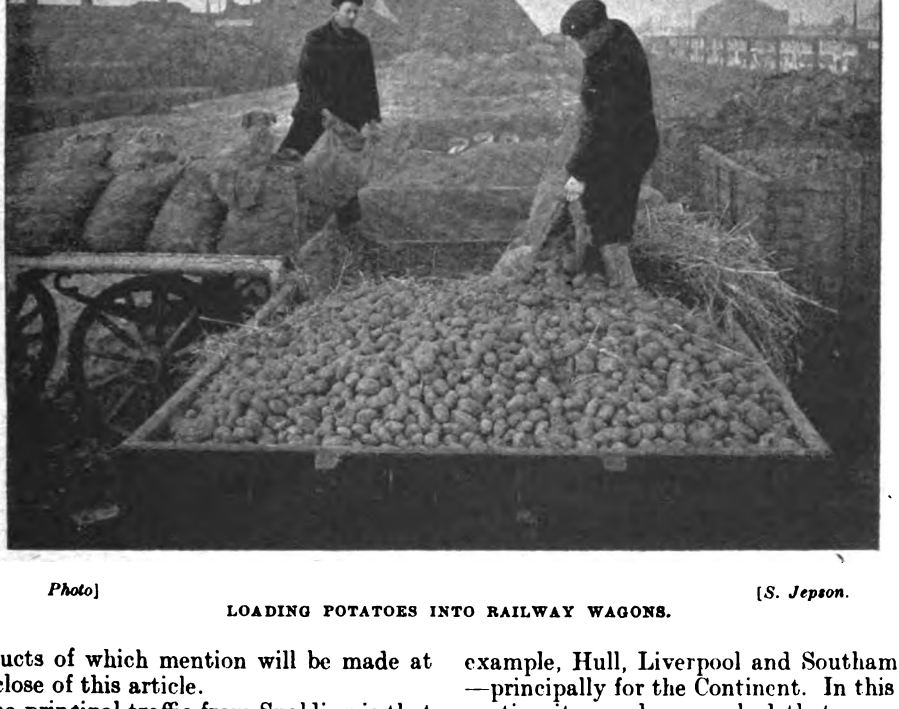
At the beginning of the new season particularly the traffic is so heavy that the six or seven special trains which are in daily working have frequently to be duplicated and even triplicated; whilst the special vegetable train, principally conveying potatoes, which is worked from Boston through Spalding and Peterborough to London has been known to consist of no less than six trains. In this way from two to four hundred wagon loads of potatoes are despatched each day during a period of about six months of each year, adding to the food supply of the nation and suggesting industrial possibilities in connection with the manufacture of bye-products of which mention will be made at the close of this article.

The principal traffic from Spalding is that conveyed by the London specials, which consists of potatoes not only for the London markets, but also for the southern lines, the West of England and, not least, the London Docks. Another train runs from Spalding *viâ* Sleaford and the Great Northern and Great Eastern Joint line to Doncaster for distribution to the North of England and the West Riding of Yorkshire. The remainder of the traffic from Spalding is worked *viâ* Boston, whence special trains run to Doncaster with traffic for the North Eastern Railway—Newcastle, Darlington, Sunderland, etc.—also to Leeds and Bradford and the West Riding generally. Next to London, Sheffield and Manchester represent the largest receiving centres, Sheffield's portion being some 40 wagons a day. The special trains to this district include Rotherham and Liverpool traffic and, in fact, the whole of Lancashire is very largely supplied from Lincolnshire.

Reference has been made to the immense quantities of potatoes which are exported from South-East Lincolnshire *viâ* the London Docks. A similar export traffic is conveyed to many other ports in the country—as, for example, Hull, Liverpool and Southampton—principally for the Continent. In this connection it may be remarked that several of the Continental countries are also big potato producers, and the successful competition of the Lincolnshire potato is undoubtedly due to its superior quality. In parts of Europe, however, Germany in particular, the potato is cultivated for uses other than food, and is the basis on which has been founded several distinct industries engaged in the manufacture of valuable bye-products, such as potato flour and potato spirit. These German industries have been fostered by the State and have become so prosperous and powerful



*Photo]* [*S. Jepson.*

LOADING POTATOES INTO RAILWAY WAGONS.

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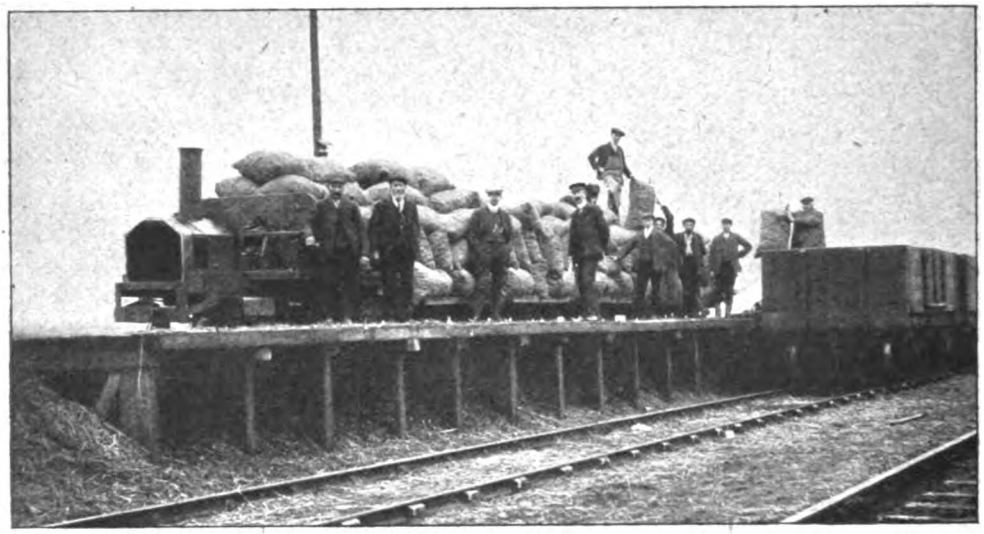

TRANSHIPPING SACKS OF POTATOES FROM LIGHT RAILWAY TRAIN TO RAILWAY WAGONS AT MESSRS. DENNIS'S PRIVATE SIDING AT LITTLEWORTH.

that they have practically monopolised the trade in potato bye-products both on the Continent and in this country. Now the productivity of the Lincolnshire potato district is so remarkable—and this can no doubt be applied to other potato-growing centres—that there would appear to be an actual danger of over-supply and consequent waste of a valuable food and commercial product; and in view of the fact that the War has neutralised the German export trade in potato bye-products, no better opportunity is likely to arise for the establishment of similar industries in England, if necessary even with Government assistance.

Thus assured of an outlet for their surplus supply, this would have the effect of stimulating the potato-growing industry to still further development, and there seems to be no reason whatever why important subsidiary potato industries should not be immediately initiated and encouraged during the War period so that England may in future successfully compete with what has hitherto been a German monopoly.

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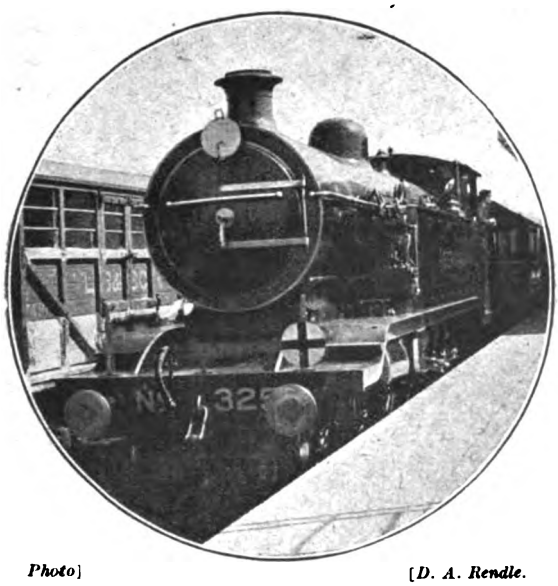

*Photo*] [*D. A. Rendle.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

4-6-2 tank engine No. 325 *Abergavenny* at Barnham Junction.

# British Locomotive Practice and Performance.

By CECIL J. ALLEN.

SEVERAL readers have written me concerning the method recently described in these columns of estimating the speed of trains from the time occupied in covering a predetermined number of rail-joints. The letter of one military friend runs thus :—" May I suggest what I consider an improvement on the method you advocate ? For a known length of rail there is always a time in seconds, for which the number of rail joints passed over gives the speed in miles per hour. For a 44 ft. 6 in. rail the time is practically 30 sec., and this figure can easily be varied to suit other rail lengths. This method does not involve turning the time for $\frac{1}{4}$-miles into miles per hour, but gives the speed direct." Before I became possessed of a chronograph, this was the method that I employed myself, and is certainly as simple a one as could be devised, although it bears no comparison as regards accuracy with the one that I outlined if a stop-watch is being used.

Briefly expressed, the above method consists in observing, not the time taken to traverse a fixed number of rail-joints, but the number of rail-joints passed over in a given time, that time being fixed in such a way, according to the length of rail, that the number of rail-joints counted is exactly equivalent to the speed in miles per hour. For example, a rate of 60 miles per hour means that 5,280 ft. are traversed per minute. When running over 30 ft. rails, therefore, 176 rail-lengths will be passed over in each minute, while 60 rail-lengths—the equivalent figure to the speed—will be covered in 20$\frac{1}{2}$ sec. All other speeds will obviously involve a proportionate number of joints passed over in 20$\frac{1}{2}$ sec., which is the " constant " for 30 ft. rail-lengths. The corresponding " constant " for 36 ft. rails is 24$\frac{1}{2}$ sec. ; for 40 ft. rails, 27$\frac{1}{2}$ sec. ; for 45 ft. rails, 31 sec. ; and for 60 ft. rails, 41 sec. To use this method, after having first determined the rail-length that is being run over, it is simply necessary to count the number of joints passed over in the " constant " time, always remembering to commence the count at 0, seeing that the number of joints exceeds the number of rail-lengths by 1. The number counted is the approximate speed in miles per hour. In order to allow of a shorter count, it is also possible to halve the " constant " time, and then to double the counted figure, so achieving the same result.

Another military correspondent puts what is substantially the same idea in different words. " If the length of rail concerned," he writes, " is taken as 30 ft., and if $x$ represents the number of rail-joints passed over in ten seconds from the ' datum ' joint, then $2x$ is the speed in miles per hour." He deduces his method thus : " A speed of 2 miles per hour is equivalent to 2·933 ft. per second, and at this rate 29·33 ft. will be covered in ten seconds. Now 29·33 is very nearly 30 ft., the length of a rail. Therefore the speed



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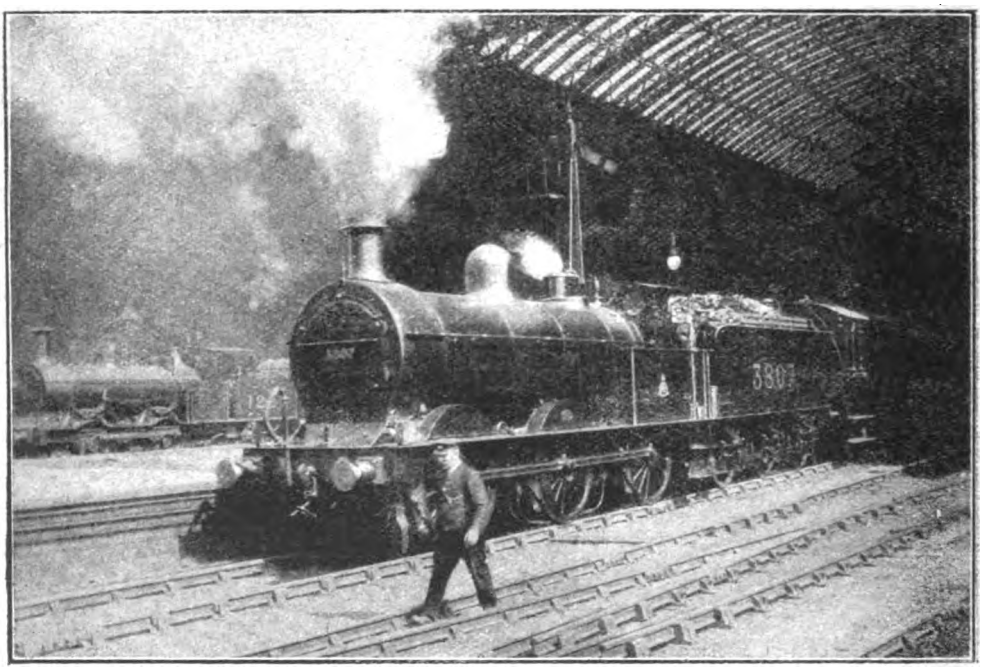


*Photo]* [*H. G. Cogger.*

MIDLAND RAILWAY.

0–6–0 goods engine No. 3807 on fast passenger train at St. Pancras.

during the whole period of 10 seconds represents the accumulations of 2 miles per hour for every rail-joint passed over. As stated above, the rule is based on a 30 ft. rail, and a very simple correction is all that is required in order to adapt it to other standard rail-lengths. Thus if the rails should be 36, 45 or 60 ft. in length it is only necessary to add respectively one-fifth, one-half or the whole number to the figure derived from the rule. In the case of a 24 ft. rail deduct one-fifth." The difference between this and the last-mentioned method is simply that a "constant" of 10 sec. is fixed upon irrespective of the rail-length concerned, and the relation between the number of joints counted in the 10 sec. and the speed is then found by simple calculation. With 30 ft. rails the number is doubled, with 45 ft. rails it is trebled, and with 60 ft. rails it is quadrupled. As the writer remarks, however, this method has "no pretentions to absolute accuracy" although "quite good enough for practical purposes."

Still less pretentious as regards accuracy is the suggestion of a younger friend, who enquires whether it would not be possible to time by means of the passing telegraph poles. Long ago I experimented with the last-mentioned method, and after having obtained in immediate sequence speeds varying from 60 to 100 miles an hour, or thereabouts, I abandoned the idea for something a trifle less approximate. Although telegraph poles certainly are erected in the open country at fairly even intervals, there is no law on the subject and local conditions may necessitate considerable variations in their spacing. For accurate observations, with due respect to the suggestions of my various friends and their utility as regards rough estimations, there is in my opinion no method to compare with that of actually counting a fixed distance in rail-joints, as a quarter or half-a-mile, and timing that distance with a chronograph, just as one would time the same distance from mile-posts. And even that method should only be employed when the actual recording off the mile-posts themselves is not possible.

Before leaving the rail-joint question, I wonder if any readers have noticed that the Great Northern Railway is now laying 60 ft. rails? This discovery came as quite a surprise to me recently when travelling on that line, but quite a number of different

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sections of the Great Northern main line have now been relaid with rails of this length.

A few further remarks are necessary to conclude what was said last month concerning the altered train services of May last. With the publication of the June "Bradshaw" the times of the modified Great Northern expresses became public property, and curiously arranged indeed they appeared to be. The 5.30 p.m. from King's Cross retained its fast booking of 117 min. to Grantham, and followed this up with an easy allowance of 59 min. on to Doncaster. After a somewhat unnecessarily generous wait of 8 min. at Doncaster, "Bradshaw" calmly contemplated the possibility of the next 32 miles on to York being covered in 27 min., the North Eastern times remaining unaltered. Further than this, the Leeds portion of the train had to wait at Doncaster until 8.55 p.m. —its previous departure time—or no less than 25 min. Since writing these lines, however, the July alterations have been announced, giving a more rational timing of this train, *i.e.*, Grantham arr. 7.31, dep. 7.34; Doncaster arr. 8.30, dep. 8.36; and York arr. 9.16 p.m., while the Leeds portion leaves Doncaster at 8.45 p.m. The times of the altered up morning expresses are also peculiar, such fast times as 58 min. from Doncaster to Grantham and 85 min. from Peterborough to London, being associated with the positively lavish allowance of 40 min. from Grantham to Peterborough—29 miles, mainly downhill. In view of the short station times shown at Grantham and Peterborough, however, it may be assumed that the working times do not correspond with these figures, the actual arrivals at Peterborough in particular being earlier than shown, in order to allow of the collection of tickets at the latter point. The latter provision is now necessary with certain up expresses, in view of the use of non-corridor rolling stock.

In turning now to performance, I wish to devote some space to the Lancashire and Yorkshire Railway—a line that does not receive overmuch attention in these columns (by force of circumstances rather than lack of appreciation), although its locomotive work is almost invariably interesting. Now that the time of the 40 min. expresses between Manchester and Liverpool has been increased by 5 min., the time-tables of the Lancashire and Yorkshire Railway do not appear to indicate anything spectacular in the way of locomotive achievement, but those who know the line, with its tremendous grades, and its congestion of traffic, will be aware that many of the short and tight intermediate times are by no means easy of

Photo] [*R. W. T. Collins.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

1.10 p.m. Victoria–Brighton train passing Preston Park. 0-4-2 locomotive No. 177.

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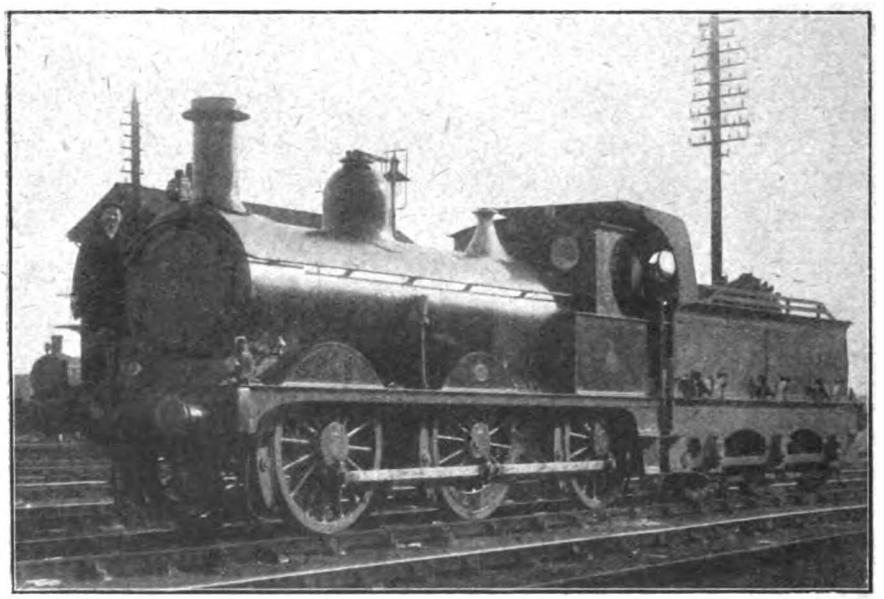
observance. As an illustration of this fact I have prepared a table of eight runs from Leeds to Manchester, six on the 1.2 p.m. express, and two further on the 5 p.m. express from Leeds. This direction of running is, in my opinion, substantially more difficult than the reverse. The trains start from Holbeck with a rise of 1½ miles at 1 in 50, 1⅞ at 1 in 146 and 3¾ at 1 in 100 to Laisterdyke, losing all the speed value of the subsequent short and sharp descent to Bowling in view of the severe service slacks in force at these two junctions. From Halifax there is a good failing start at 1 in 120 for 3 miles to Milner Royd Junction, where the East and West main line is joined, just before

Most of the expresses in the last-mentioned direction of running consist of three 8-wheelers from Leeds, while at Halifax the Leeds portion usually runs through and backs on to a corresponding number from Bradford. Thus from Halifax there are six, or occasionally seven, 8-wheelers on to Manchester, while at Manchester the Bradford portion is in most cases again detached, leaving three or four vehicles to go on to Liverpool. Similar arrangements, in reverse, take place in the opposite direction, with the exception that the Bradford division more usually takes place at Low Moor rather than Halifax.

Of all the west-bound trains the 1.2 p.m.



*Photo]* [*J. Macartney Robbins.*

MIDLAND RAILWAY.

0-6-0 goods engine No. 3043, fitted with cab to tender.

Sowerby Bridge, but after that follows the long ascent to Littleborough Tunnel, commencing with 5½ miles at 1 in 330, and concluding with 5 at 1 in 183, and 1½ at 1 in 160, the last-mentioned stretch affording a bad start from Todmorden for trains in this direction. The only really favourable stretch is the concluding 11½ miles from Rochdale into Manchester, but here congestion of traffic, with its resultant signal checks, is such that the mile-a-minute rate is seldom exceeded, even if attained at all. Thus west-bound trains reap all the difficulties of the adverse grades, and secure but little, if any, advantage from those that are favourable.

out of Leeds is one of the most difficult to work in its early stages, as it used to include a 12-wheeled restaurant car in addition to three vestibuled 8-wheelers. Even now it loads daily to four corridor eights, but there is also a Southport portion of two 8-wheelers to carry as far as Low Moor. Six 8-wheelers may not sound a very formidable load, but it means an increase of 50 per cent., and makes all the difference in starting up a bank of 1 in 50 on a tight schedule. For the 10½ miles to Low Moor, including the tremendous rise to Laisterdyke and the very severe slacks at that junction and at Bowling, are only allowed 18 min., the result of making no extra allowance for the extra load being

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that time is inevitably exceeded. Eight minutes for the 5¼ miles from Low Moor to Halifax is a normal time for a direct stop, but the setting back means an average increase to about 9½ min., the time thus lost partially regained by curtailment of the 4 min. booked stop. After this the allowance of 18 min. for the 13½ miles to Todmorden is reasonable with this load, as would also be the 27 min. from Todmorden to Manchester, 19¼ miles, were it not for the chronic signal delays beyond Middleton Junction. Very smart station work at both Low Moor, Halifax and Todmorden result in the trains usually being away on time, or nearly so, from the last-mentioned point, although the concluding delays often preclude an absolutely punctual arrival.

The tabulated runs require but little comment. In the first three cases the 1.2 p.m. from Leeds was still a restaurant car train, but runs 4 to 6 were made after the restaurant car had been withdrawn, and an ordinary corridor coach substituted. The engine was an "Atlantic" in every instance. On No. 1 run the start was sluggish, the speed on the 1 in 50 only rising to 18·7 m.p.h., and in consequence 2½ min. were lost to Low Moor, and a further ¾ min. by overstepping the allowance there. This loss continued until the end of the run, signal delays nullifying the gain effected by smart station work at Todmorden, and fast running from Littleborough to Middleton Junction. No. 2 run commenced with a noteworthy start, and we left Low Moor and Halifax on time, but a dead stand of 65 sec. for signals between

LANCASTER AND YORKSHIRE RAILWAY: LEEDS—MANCHESTER.

| Distance (miles) | Run No. / Engine No. / Load ex-Holbeck / „ „ Low Moor / „ „ Halifax | Schedule (mins.) | 1 — | 2 1424 | 3 1392 | 4 718 | 5 †1424 | 6 718 | Schedule (mins.) | 7 — | 8 1422 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 26 axles = 180 tons; 18 axles = 130 tons; 30 axles = 220 tons | | | 24 axles = 170 tons; 16 axles = 120 tons; 28 axles = 210 tons | | | | 12 axles = 90 tons; 180 tons | 210 tons |
| | | | M.S. | M.S. | M.S. | M.S. | M.S. | M.S. | | M.S. | M.S. |
| 0.0 | Leeds (Holbeck) dep. | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 |
| 1.36 | Armley .. pass | — | 5.00 | 4.40 | 4.45 | 5.15 | 4.00 sigs. | 4.35 | — | 4.00 | 4.00 |
| 7.7 | Laisterdyke* „ | 12 | 14.35 | 13.25 | 13.35 | 15.30 | 14.25 | 13.10 | 12 | 12.45 | 12.25 |
| 11.4 | Low Moor arr. | 18 | 20.30 | 18.50 | 18.50 | 21.20 | 20.25 | 18.50 | 18 | 19.00 | 18.40 |
| | Low Moor dep. | 20 | 23.15 | 20.05 | 21.25 | 22.30 | 22.05 | 20.45 sigs. | 19 | 20.10 | 19.40 sigs. |
| 16.21 | Halifax arr. | ‡28 | 32.45 | 29.35 | 30.40 | 32.15 | 31.55 | 31.10 | ‡27 | 29.10 | 30.45 |
| | Halifax dep. | 32 | 34.45 | 31.30 sig. stop | 33.15 | 33.45 | 33.35 | 32.45 | 31 | 31.05 | 33.25 |
| 19.73 | Sowerby Bridge pass | 38 | 40.15 | 39.25 | 38.35 | 39.10 | 39.00 | 38.00 | 37 | 36.40 | 38.45 |
| 24.78 | Hebden Bridge „ | 44 | 46.20 | 45.20 | 44.30 | 45.45 | 45.30 | 44.10 | 43 | 43.20 | 44.50 |
| 29.36 | Todmorden arr. | 50 | 52.45 | 51.35 | 50.50 | 52.35 | 52.00 | 50.55 | 49 | 50.25 | 51.30 |
| | Todmorden dep. | 53 | 54.20 | 52.50 | 52.40 | 54.50 | 53.10 | 52.45 | 51 | 53.10 | 54.15 |
| 30.66 | Walsden .. pass | — | 58.05 p.w.s. | 56.40 p.w.s. | 56.15 p.w.s. | 58.30 | 56.45 | 56.35 p.w.s. | — | 56.45 | 57.40 |
| 34.64 | Littleborough „ | — | 64.35 | 62.35 | 63.00 | 64.00 | 62.00 | 63.30 | — | 62.20 | 63.20 |
| 38.12 | Rochdale arr. pass | | pass | pass | pass | pass | pass | pass | 65 | 66.25 | 67.05 |
| | Rochdale dep. | 65 | 68.15 | 67.10 | 67.50 | 67.40 | 66.15 | 67.15 | 68 | 68.25 | 69.20 |
| 43.30 | Middleton Jc. pass | — | 73.45 sigs. | 72.25 | 73.15 sigs. | 73.10 sigs. | 71.35 | 72.55 | 75 | 76.15 | 76.20 sigs. |
| 45.76 | Newton Heath „ | — | 76.45 sigs. | 75.10 sigs. | 76.10 sigs. | 76.35 sigs. | 74.10 | 75.45 sigs. | — | 79.35 sigs. | 79.55 sigs. |
| 48.49 | Manchester .. arr. | 80 | 83.20 | 80.00 | 80.30 | 82.50 | 80.10 | 80.55 | 83 | 84.15 | 84.45 |
| | | | min. | min. | min. | min. | min. | min. | | min. | min. |
| 48.49 | Net running time | ‡73 | 73¾ | 72 | 72 | 75½ | 72 | 72½ | ‡75 | 74¾ | 72½ |

† Piloted by 2-4-2 T No. 140 to Low Moor. * Severe service slack here, and at Bowling Junction. ‡ Two min. more should be added to this booked time for running through Halifax Station, and setting back on to the Bradford portion, and has been added to the total booked running times. sigs., Signal check. p.w.s., Permanent way caution. Thick horizontal line indicates booked stop.

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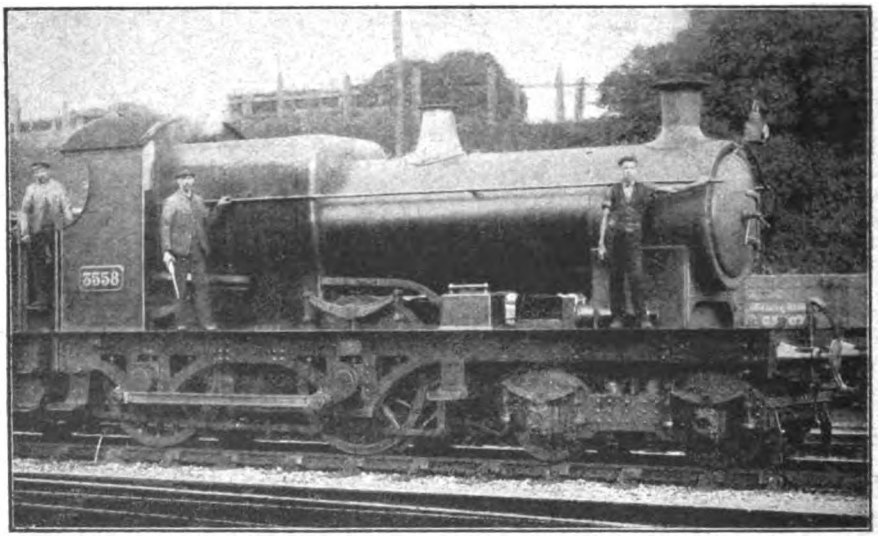
Halifax and Copley involved a loss of 2½ min. to Todmorden, some of the lost time being retrieved by excellent work on the rising grades beyond Sowerby Bridge—the fastest of the series. We also did well from Rochdale onwards, touching 60 m.p.h. at Castleton, and 65·2 at Middleton Junction, and achieving the fastest time of the series between these points. No. 3 run also opened well to Low Moor, although overtime at that station and at Halifax made us late away from the last-mentioned point; still, with a smart run from Halifax to Todmorden, repeating the excellent time of the preceding journey from Sowerby Bridge to Hebden Bridge, we left Todmorden on time. The starting time from Todmorden to Walsden, up a continuous grade of 1 in 182 and 1 in 160, was quite noteworthy, but the delay through the tunnel was exceptional, and the recovery beyond slow. Even then, however, we were only ½ min. late on arrival.

On No. 4 run, the first of the three with slightly reduced load, No. 718 made a somewhat inglorious start, dropping 3½ min. to Laisterdyke, while the times thence to Halifax were also on the slow side. So, indeed, was the major part of the journey, although Summit Tunnel was taken rather faster than usual; nevertheless we arrived nearly 3 min. late. The unusually fast start of No. 5 run was due to the presence of a 2–4–2 "tank" piloting our "Atlantic" to Low Moor—a curious combination of engines—but signal delays beyond Armley rendered null and void any advantage that we might have derived from the double-heading. But such good work was done beyond Todmorden that we passed Newton Heath, 16½ miles, in 21 min. from the Todmorden start, and should have arrived before time but for the usual terminal delays. As it was, this run shared with No. 2 the distinction of keeping time from Todmorden to Manchester, delays included, and of arriving punctually. On No. 6 run No. 718 redeemed the reputation that it had made two journeys earlier. The start to Armley was the best (unpiloted) of any, equalling even the figures of runs 7 and 8, although with nearly twice the load; the speed rose to 21·8 m.p.h. on the 1 in 50, and was maintained at 40·5 on the subsequent long ascent at 1 in 90. But the running from Laisterdyke to Low Moor was unusually cautious, so that the times out to the latter point tied with those of runs 2 and 3. After that, as official *communiqués* have it, there is "nothing to report."

Of the two journeys on the 5 p.m. from Leeds, shown in columns 7 and 8, the latter was decidedly the better, although on the former occasion a hurricane of wind and rain hampered the running in many places. In each case the lightness of the load enabled a rapid start to be made to Laisterdyke, although much greater caution than usual was displayed from there down to Low Moor. After Halifax No. 7 run has no features of




GREAT WESTERN RAILWAY.
4–4–0 locomotive ("Stella" class) with modern boiler and fittings.

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note, but No. 1422, with as heavy a load as on runs 4, 5 and 6, did well, especially beyond Todmorden. The start from Todmorden up to Walsden was excellent, so that 70 sec. were economised on the booked time of 14 min. from Todmorden to Rochdale. Despite signal delays, also, the final length into Manchester was almost run in booked time. Considering the volume of traffic that passes over these lines, however, and the inadvisability of attempting anything in the nature of high speed, it is quite surprising that these trains keep as good time as is indicated in this table.

In the opposite direction I have not much to record. Two of the large 4-cylinder 4–6–0's gave curiously similar and rather sluggish times on the 2.25 p.m. from Manchester to Leeds. In the first case No. 1520, with 210 tons, took 19 min. 25 sec. out to Rochdale, although checked twice slightly by signal near Newton Heath. No. 1521, with 220 tons, and a check at Castleton, took 18½ min. The booked allowance of 18 min. for this 10½ miles' journey includes, it must be remembered, allowance for the tremendous rise out of Manchester, the first 5½ and 3 subsequent miles of which are as steep as 1 in 150, and in parts as steep even as 1 in 63. After leaving Rochdale 1520 passed Todmorden, 8¾ miles, in 13 min. 10 sec., and 1521 in 13 min. 40 sec., but in each case the running was so terribly cautious on the 9½ falling miles to Sowerby Bridge, that the former engine took 11 min. 5 sec., and the latter 11 min. 20 sec. for this distance. No. 1521 at one point was only doing 36 m.p.h. (with steam shut off, of course) while No. 1520 "eased" to 45 m.p.h. So on both runs the Rochdale–Halifax allowance of 29 min. was exceeded, No. 1520 taking 30¼ min., and No. 1521 30 min. 20 sec. From Halifax to Low Moor, booked 8 min., the former engine ran in 8 min. 40 sec., but the latter covered the distance in ½ min. less. At Low Moor an "Atlantic" took charge of the Leeds portion—90 tons—in each case, and on one run the distance to Holbeck was compassed in 15½ min. despite a very severe signal check at Laisterdyke, in addition to the usual slack at Bowling; on the other occasion the time was 15 min. 25 sec., against 16 min. booked.

I will now hold over a series of runs made on the erstwhile 40 min. expresses between Manchester and Liverpool by the Lancashire and Yorkshire route—immediately prior to their deceleration—until I have completed for comparison a similar series now in course of "collection" on the Cheshire Lines route. But the occasion is opportune, while I am speaking of Manchester, for describing one or two random evening runs in the neighbourhood of that city. First, before leaving the Lancashire and Yorkshire Railway, I may mention a run on the 5.55 p.m. express from Manchester to Blackpool, allowed the fairly generous allowance of 66 min. for the 44½ miles to Lytham, although it must be confessed that there are some fearsome gradients to traverse *en route*, together with a number of slacks to observe, including the prolonged "crawl" through Preston. The load consisted of ten 8-wheelers, all vestibuled but one, and weighing with passengers fully 300 tons, and included a slip portion of three vehicles for Kirkham, destined for Fleetwood, while the engine was an "Atlantic," No. 1419.

From Victoria station we passed Pendleton, 2¼ miles, in 5¼ min., but the next 3½ miles to Moorside occupied 6 min. 20 sec., speed falling on the two steepest miles of the bank (at 1 in 92, 84—1⅛ miles—and 118) to 25·9 m.p.h. After this we went ahead a little more briskly, covering the 7¾ miles on to Dobb's Brow Junction, beyond Daisy Hill, where the Liverpool main line is left, in 9¼ min. On the short 3⅝ miles' connecting spur between the Manchester-Liverpool and Manchester–Preston main lines, from Dobb's Brow Junction to Horwich Fork Junction, there is a tremendous climb to Hilton House; I do not know the exact grade, but our speed fell to 27·4 m.p.h., and we took 6 min. between these points. Thus the first 17 miles had taken 26 min. 50 sec., but we were running exactly on schedule time throughout, and had now 10 sec. in hand. After that we did some smart running on the slightly falling grades to Chorley, covering the 5½ miles between these points in 5 min. 40 sec., and we had just reached 63·8 m.p.h. on the 1 in 132 beyond when we almost stopped by signal at Euxton. In this way the 8⅝ miles from Chorley to Preston, which are all favourable and should have been covered in a fraction under 10 min., occupied 12 min. 55 sec. Preston was passed at under 15 m.p.h., so that the next 3 miles to Lea Road took 5 min. 10 sec., but from there we ran to a dead stop at Kirkham—instead of slipping, for some reason that I did not ascertain—in exactly 6 min., 4⅞ miles. Relieved of 85 tons of the load, No. 1419 then ran from Kirkham to Lytham, 5¾ miles, in 8 min. 50 sec., start-to-stop. So, despite the Euxton check, and the 30 sec. spent standing at Kirkham, which cost between them fully 6 min. as

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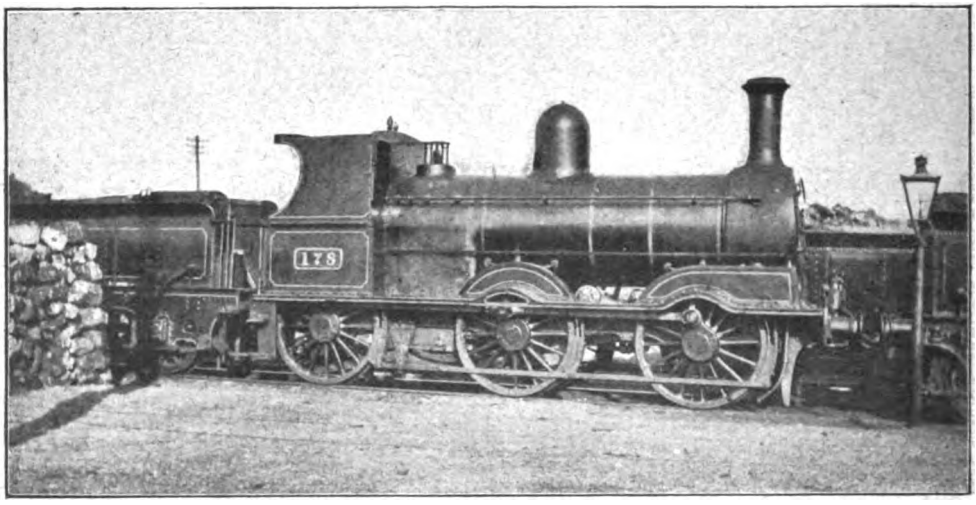
compared with an unchecked run, we had completed the journey in 5 sec. under the 66 min. allowed. The net time of 60 min., indeed, compares favourably with the allowance of 61 min. that was in force prior to the recent decelerations.

Reference may also be made to two experiences on the London and North Western 4.55 p.m. express from Exchange station to North Wales. This is a smartly timed express, booked to cover the 40 miles from Exchange to Chester, inclusive of a very severe check at Earlestown Junction and a slighter one at Warrington, in 48 min., at an average of exactly 50 m.p.h. From Chester this train used to cover the 30 miles on to Rhyl in 34 min., at an average of 53 m.p.h., but a stop is now made at Prestatyn, the allowance for this 26⅜ miles being 31 min., or 51 m.p.h. only. Further than this, the train concerned is a heavy one almost all the year round, conveying as it does through portions for Bangor and Llandudno, as well as two large "club" saloons of a similar order to those used on certain Lancashire and Yorkshire Railway Manchester–Blackpool trains.

On the first occasion our engine was a 4–4–0 superheater—No. 1559, *Drake*—and the load 11 eight-wheelers (nine of them large 57 ft. vehicles) weighing 302 tons empty and 320 tons loaded. We started well, passing Eccles, 3¾ miles, in 6 min. 35 sec.; Glazebury, 10½ miles, in 13 min. 20 sec., and Newton-le-Willows, 15½ miles, in 18 min. 25 sec. "Even time" was maintained between Patricroft and Newton, 10¾ miles, speed rising on the level to 63·8 m.p.h. Earlestown Junction, 16½ miles, was passed very cautiously in 19¾ min. from the start, and, aided by the sharp 1 in 132 descent from here to Winwick Junction, the next 5 miles to Warrington took only 6¼ min., with a maximum rate of 58·5 m.p.h. Beyond Warrington we slacked at Walton New Junction, and speed fell further on the ascent over the Ship Canal, although we recovered to 52 m.p.h. at Daresbury. On the ascent to Sutton Tunnel the speed fell to 46·4 m.p.h., the 6¾ miles from Warrington to Halton taking 8 min. 10 sec., but the next 8¾ undulating miles from Halton to Mickle Trafford were covered in 9 min. 5 sec., speed ranging from 52·5 to 61·6 m.p.h. A very slow approach indeed was made to Chester, the last 3 down-hill miles taking 5 sec. under 5 min., but we completed the journey from Manchester in 48 min. 10 sec., or practically as scheduled. After leaving Chester we passed Sandycroft, 5¾ miles, in 8 min. 5 sec., but thenceforward the running on an almost level road was not very enterprising, as we had been 12 min. late away from Manchester waiting for the Hull and Leeds connection. The 6¾ miles from Sandycroft to Flint took 6 min. 50 sec.; the 7⅝ miles thence to Mostyn 8 min.; the 6¼ miles on to Prestatyn 6½ min.; and the last 3⅝ miles to Rhyl stop 4¼ min. Thus we had run the 30 miles from Chester to Rhyl in 33 min.




*Photo]* [*T. Grove White.*

GREAT SOUTHERN AND WESTERN RAILWAY.

0–6–0 goods engine No. 178.

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40 sec., although I think we might possibly have done a little better, seeing that the speed at no point rose above the mile-a-minute level.

The second trip was made recently behind one of the superheater 4–6–0 "Prince of Wales" class engines—No. 321, *Henry W. Longfellow*—and the load from Manchester was a trifle less, although a heavy complement of passengers (some standing in the corridors throughout) brought it up almost to the figure of the last journey. Ten 8-wheelers were run to Chester, weighing 285 tons empty, and about 310 tons full. As far as Eccles the start tied with that of the last run, but it took us 13¾ min. to get through Glazebury, 18 min. 55 sec. to Newton-le-Willows, and 20 min. 10 sec. to Earlestown Junction, speed only rising to 61·6 m.p.h. for a short distance near Glazebury. We recovered rapidly from Earlestown slack, however, and were doing 60 an hour at Winwick Junction; in fact, we should have probably been through Warrington on time but for a dead stand for signals ¾-mile north of the station. This 20¾ miles' journey had taken 26 min. 5 sec. start-to-stop, including Earlestown Junction slack. Re-starting, we passed Warrington slowly in 2 min. 10 sec., ran the next 6¾ miles up to Halton in 9 min. 40 sec., covered the Halton-Mickle Trafford length in 9 min. 10 sec., and the final 3 miles into Chester in 4 min. 40 sec. The gross time was thus 52 min. 10 sec. from Manchester, but the net time again about 48 min., the running being throughout very similar to that of the preceding journey. So it was also beyond Chester, where we attached a further large 8-wheeler, bringing our total load up to 340 tons. Again the times tied to Sandycroft, but after that the six-coupled engine was a trifle sluggish, taking 7 min. 5 sec. from Sandycroft to Flint, 8 min. thence to Mostyn, and 6 min. 50 sec. for the 6¼ miles from Mostyn to Prestatyn stop. From the latter point, after 35 sec. standing, we ran to Rhyl very smartly in 6¼ min. start-to-stop, the distance being 3¾ miles. From Chester to Prestatyn we had covered the 26⅜ miles in exactly 30 min., and our time from Chester to Rhyl was 36 min. 50 sec.—respectively 1 min. and 2 min. 10 sec. under schedule time.

The return journeys were both worth chronicling. In each case the train concerned was the 6.10 p.m. from Llandudno to Liverpool and Manchester, allowed 35 min. for the 30 miles from Rhyl to Chester, and both runs being made on Mondays in the summer, the loads were tremendous and the vehicles packed to repletion. On the first run the non-superheated 4–4–0 "Precursor"—*Senator*, No. 305—had a vast train of twelve 8-wheelers (almost all large non-corridor stock) and four 6-wheelers, 60 axles, 366 tons empty, and not less than 400 or 405 tons full. The acceleration was slow, but at Prestatyn we were doing 50 m.p.h., at Talacre 52·9, at Mostyn 56·3, at Holywell Junction 59·2, and at Bagillt we reached the mile-a-minute rate. Going inland and slightly uphill to Flint we fell in speed to 58·5 m.p.h., but accelerated again to 60·8 at Connah's Quay; a similar fall to 57 m.p.h. at Queensferry preceded a rise to 60·8 at Sandycroft. So we passed Prestatyn, 3⅝ miles, in 6 min. 55 sec.; Mostyn, 9⅞ miles, in 14 min.; Flint, 17½ miles, in 21 min. 50 sec.; Queensferry, 23 miles, in 27 min. 20 sec.; and Saltney Junction, 28⅛ miles, in 32 min. 25 sec. From here we should have arrived easily on schedule time but for serious delays outside Chester. On the second run *Sunbeam*, No. 2062, an engine of a similar type but now having the advantage of superheater equipment, did still better, even though the load was one of 62 axles—14 eight-wheelers and 2 six-wheelers. An even greater proportionate complement of passengers was carried than before, the tare weight of 376 tons being increased to a gross weight of fully 415 tons, but the superheater engine had the advantage throughout. We were doing 55·6 m.p.h. at Talacre and 60 as soon at Mostyn, while this rate was increased to 63·8 at Holywell. The minimum speed at Queensferry was 59·2 m.p.h., and the maximum beyond Sandycroft 62·5. So Prestatyn was passed in 6¾ min., Mostyn in 13 min. 35 sec.; Flint in 21 min. 20 sec.; Queensferry in 26¾ min.; and Saltney Junction in 31¾ min. Finally we stopped by signal just outside Chester General station in 34 min. from the start. Both of these were very smart runs under onerous working conditions.

Another Manchester evening run was with the London and North Western non-stop evening express to Buxton, leaving London Road at 5.40 p.m., but in this case the work was not particularly interesting as the load was very light. It was, indeed, one of only 5 small 8-wheelers weighing empty 105 tons and full 115 tons, while the engine was a "Precursor" 4–4–2 tank, No. 139. It took us 10 min. to get through Stockport, 5⅞ miles, and, after passing that station very slowly, 12 min. 5 sec. for the next 6⅝ miles to Disley. But it must be admitted that the last-

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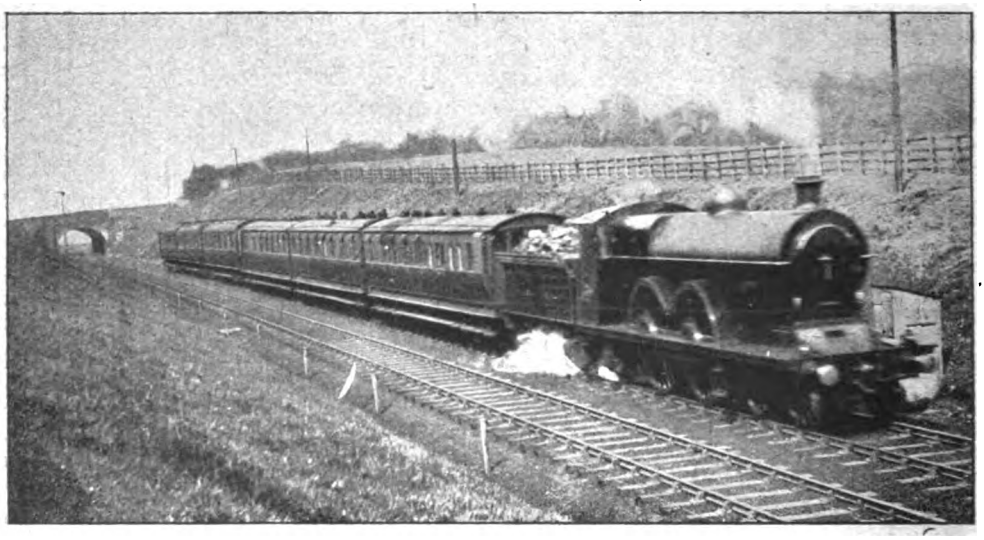
mentioned stretch is entirely uphill, and concludes with a long piece at 1 in 80, where our speed fell to 25·7 m.p.h.; further, we were keeping schedule time exactly. The next four easy miles to Whaley Bridge we covered in 4 min. 40 sec., touching 56·3 m.p.h., but the unbroken 6 miles' ascent thence to Dove Holes, boasting lengthy stretches as steep as 1 in 58, on which our rate fell to 23·7 m.p.h., occupied as much as 12½ min. So it took us 43 min. 35 sec. to reach Fairfield, 25 miles out, and after ¾ min. standing there we ran the remaining ½ mile into Buxton in 2 min. 35 sec., making a total time of 46¾ min. The working time-table allows 48 min. overall when the further south with one of the larger 4–6–2 superheater tank engines, No. 1795, the load in this case being really heavy—in all 50 axles, weighing loaded 335 tons. Yet No. 1795, starting from Rugby, passed Long Buckby, 9¼ miles (mainly uphill) in 14 min. 25 sec., covered the 8 falling miles on to the 67½ mile-post in 7 min. 25 sec., with a sustained maximum of 69·2 m.p.h., and reached Northampton, 19 miles, in 24 min. 50 sec., despite a slight signal check outside the station. This meant a net time of a fraction over 24 min., against a booking of 25 min. Quite smart work, this, for a tank locomotive so heavily loaded.

Now that we have arrived in North-



*Photo]* [*A. Conville.*

LANCASHIRE AND YORKSHIRE RAILWAY.

Fleetwood-Bradford Express near Rishton. 4–4–2 engine No. 1398.

Fairfield stop is made, so that we had time well in hand. A much more interesting recent run with one of these engines was from Crewe to Stockport with six 8-wheelers, or 135 tons. In this case we passed Sandbach, 4⅝ miles, in 6 min. 20 sec. and Goostrey, 10⅜ miles in 12¼ min., but were badly checked by signal at Chelford, so that the 6⅞ miles from Goostrey to Alderley Edge took 8 min. 20 sec. Then we ran the 5⅜ miles on to Cheadle Hulme in 5 min. 10 sec. touching 66·1 m.p.h., and could easily have completed the 25 miles to Stockport in 29 min., despite the Chelford delay, had it not been for a dead stand for signals beyond Cheadle Hulme. But the going was excellent throughout. Still finer was a short run amptonshire, I may as well conclude by a description of two quite topical runs on a couple of expresses whose modified working was dealt with in some detail in last month's issue. They are the 6.50 p.m. Euston–Birmingham express, and the Liverpool express now due in Euston at 9.30 p.m., these "connecting" at Blisworth (admirably from the timing standpoint) by a slip off the former, due at 8.3 p.m., and the stop of the latter, leaving at 8.15 p.m. for London, the stops being in each case to make Northampton connections. Thus the "round" may be made from London in less than 2¾ hours, the 57¼ miles between Willesden and Blisworth being booked to be covered in 61 min. in one

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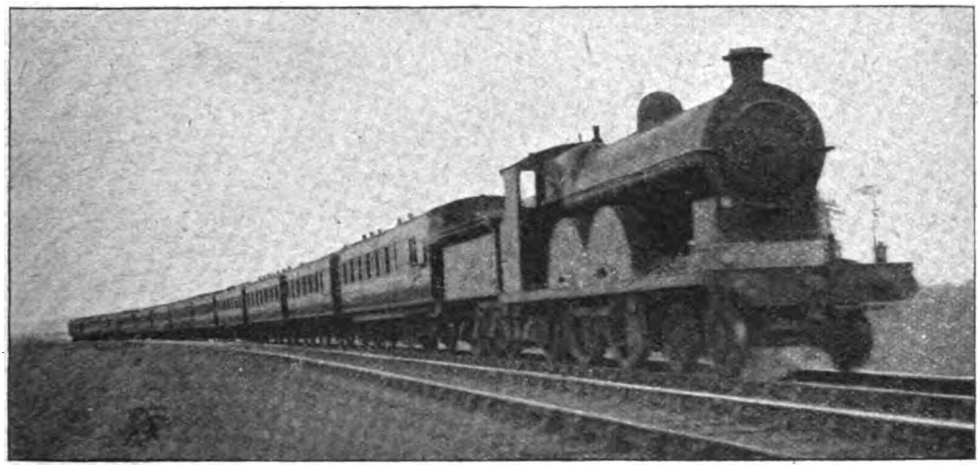
direction and 62 min. in the other. As a result of making this expedition on a recent evening, I feel convinced that both trains must, in virtue of both their increased loading and their tight times, be decidedly harder to work than they were, not only before the restaurant cars ceased to run, but even before their respective decelerations. For the down train loaded to 13 eight-wheelers, 11 of them 57 ft. cars, and a six-wheeler, 55 axles, 388 tons empty and 410 tons full, while the latter beat this record with 14 mixed eight-wheelers and a six-wheeler, 59 axles, 404 tons empty and 425 tons full.

The down journey was of particular interest to me in that it was the first occasion on which I had seen a 4–6–0 locomotive at work on one of the London and North Western Birmingham expresses, although I believe these engines are now fairly generally employed on some of the heavier trains. On this run the engine was No. 1679, *Lord Byron*, of the superheater "Prince of Wales" class. The first achievement of the journey was an exceedingly smart run to Willesden, the initial ascent to Chalk Farm (mainly 1 in 70), 1¼ miles, being surmounted in 3 min. 55 sec., and Willesden Junction, 5⅝ miles, being reached in 9 min. 40 sec., start to stop—equivalent to passing in not more than 9 min. Starting again, we had attained a rate of 48·9 m.p.h. at Sudbury, and from there accelerated steadily up the ensuing 7 miles at 1 in 341–330, passing Harrow at 51·3 m.p.h., and Pinner at 52·9, while the mile down at 1 in 440 to Watford brought us up to exactly 60 m.p.h. So we passed Harrow, 5⅞ miles, in 9 min., Watford, 12 miles, in 15 min. 35 sec., and Langley, 15½ miles, in 19¼ min. Approaching Boxmoor we were still doing 55·6 m.p.h., when unfortunately there befell us a disastrous signal check, bringing the speed right down to 15 m.p.h., and causing the 10⅝ miles from Langley to Tring to take 15¼ min., and the 26½ miles from Willesden 34½ min., whereas I am confident that, unchecked, we should have been through Tring in 31 min. After Tring we ran well touching a top speed of 71·4 m.p.h. three times—beyond Cheddington and at both Bletchley and Wolverton—with slight intervening lapses to 69·2 m.p.h. So the 15 miles from Tring to Bletchley were covered in 13 min. 35 sec., and the 8⅛ miles thence to Castlethorpe in 7 min. Roade bank was tackled in good style, its 6 miles, mainly at 1 in 330–335, bringing the speed down to 52·9 m.p.h.; the 5 miles from Castlethorpe had taken 5¼ min. In 3½ min. more the slip portion of 3 eight-wheelers, in which, sadly enough—this start was just enough to whet the appetite!—I was travelling, came to rest at Blisworth, having covered the 57¼ miles from Willesden in 63 min. 50 sec., or rather less than 60½ min. net. This was first class work with such a load.



*Photo]* [*E. Mason.*

LANCASHIRE AND YORKSHIRE RAILWAY.
12.50 (Sats. only) Manchester-Blackpool Express.

On the return journey the Liverpool express came into Blisworth on time at 8.12 p.m., although it did not leave so,



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owing to a prolonged stoppage and a second drawing up in view of its length. As previously mentioned, the load was one of 425 tons in all, while the train engine was a non-superheater "Precursor," rejoicing in the somewhat unusual number 1, and the name of *Clive*, piloted by a 2–4–0 "Jumbo." Despite 2½ miles uphill start at 1 in 326, we were through Roade, 3 miles, in 5 min. 40 sec., and covered the 7⅜ downhill and level miles thence to Wolverton in 7 min. 5 sec., touching a maximum of 69·2 m.p.h. Speed gradually fell on the slight but continually rising grades beyond, to 60·8 m.p.h. at Bletchley, 57·7 at Leighton, and 54·5 at Cheddington, while the 6¼ miles at 1 in 330 to Tring Summit brought the rate down to steady 50. Premature notching up, however, was responsible for a further fall to 48·4 m.p.h. on the level mile at the summit. Our time from Wolverton to Bletchley, 5¾ miles, had been 5½ min; from Bletchley to Leighton, 6½ miles, 6 min. 35 sec.; and from Leighton to Tring, 8½ miles, 9 min. 20 sec., Tring being passed in 15 min. 55 sec. from Bletchley, and 34 min. 10 sec. from Blisworth, 31⅛ miles. On the descent to Willesden acceleration was slow, but we did finally touch 70·3 m.p.h. at Bushey, and 69·2 m.p.h. at Sudbury. The 7⅛ miles from Tring to Boxmoor took 7 min. 25 sec.; the 7 miles thence to Watford 6 min. 10 sec.; the 6⅛ miles from Watford to Harrow, 5 min. 55 sec.; and Sudbury, 54¾ miles from the start, was passed in 56 min. 35 sec. Owing to a very long drawn-out stop at Willesden, in "fitting" the train to the platform, the 57¼ miles' journey from Blisworth actually took 60¾ min., but a normal stop would have resulted in the run being completed in the even hour, against a booking of 62 min. Thus these inaugural runs on the modified trains proved in every way successful.

I might perhaps be permitted to take this opportunity of thanking various readers for communications recently received, which I have perused with unabated interest, although increasing pressure of work makes it no longer possible for me to reply to each correspondent individually as heretofore. I have, however, filed all the logs and taken a note of the subjects discussed for future reference in these columns when suitable opportunities offer themselves. It might also be well to mention that I have recently changed my address, so that those friends who have written me at home would do well to address their next letters to the care of the Editor. And I need hardly add that I am always delighted to hear from any correspondent—as a "co-enthusiast" in all things pertaining to railways—concerning the matters that are discussed from month to month in these articles.

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NAPIER AMBULANCE VAN SUPPLIED TO THE NEW ZEALAND EXPEDITIONARY FORCE.

# A Visit to the Napier Works.

THE day has gone by when the motor road vehicle was considered only as a rival to the railway, and now the motor omnibus, the lorry, the light parcel van and the motor cab are utilised directly or indirectly in connection with railway activities of all kinds. Motor omnibus services are worked by several companies; lorries and light or heavy vans are used for goods and parcel distribution; motor cabs are strongly in evidence at every large railway station; and private or semi-private cars are frequently utilised in connection with railway-arranged tours of various kinds, such as those operated in normal times through the Shakespeare country by the Great Central Railway.

But the claims of the motor car industry at this period are even stronger. In the railway world motor road vehicles have proved valuable helpmeets instead of rivals; and in national service they now claim a position at home only second to the railways in regard to their wide usefulness in these times of stress and difficulty, while in the war areas motor transport has proved all-important.

It is, therefore, only fitting that in the widely read and, judging from the character and comprehensive scope of correspondence received from all quarters (including the indefinite districts referred to as "The Front"), highly appreciated pages of the RAILWAY MAGAZINE, that some attention should be given to the construction and work of a branch of mechanical traction so near akin to that of railway transport; and it was with pleasure that we accepted an invitation to inspect the well-known works of the firm of D. Napier & Son, Ltd., at Acton.

Developed from an old-established business concerned mainly with special machinery calling for minute exactitude of workmanship, including gold coin weighing, testing and selecting machines as still used in our own Royal Mint, as well as Mints in several European countries and in the Colonies (this branch of the business is still carried on), a new and much more extensive scope has been created, based upon the same peculiar qualifications in regard to micrometric accuracy of finish, until the name of Napier, as applied to motor road vehicles, has become virtually synonymous with high-class workmanship and excellence. Indeed, it has never been claimed that Napier cars are cheap in first cost; but in the long run it is contended that a good price for a first-class article justifies itself as truest economy.

The works at Acton now cover an area of about 8½ acres, including recent extensions, and further additions are in progress. Normally about 1,700 hands are continuously employed, and in view of national demands for motor road vehicles and like work, which have throughout included a considerable use of Napier cars, and particularly their lorries carrying useful loads of 30 cwt. and 3½ tons, the works are fully occupied. A small



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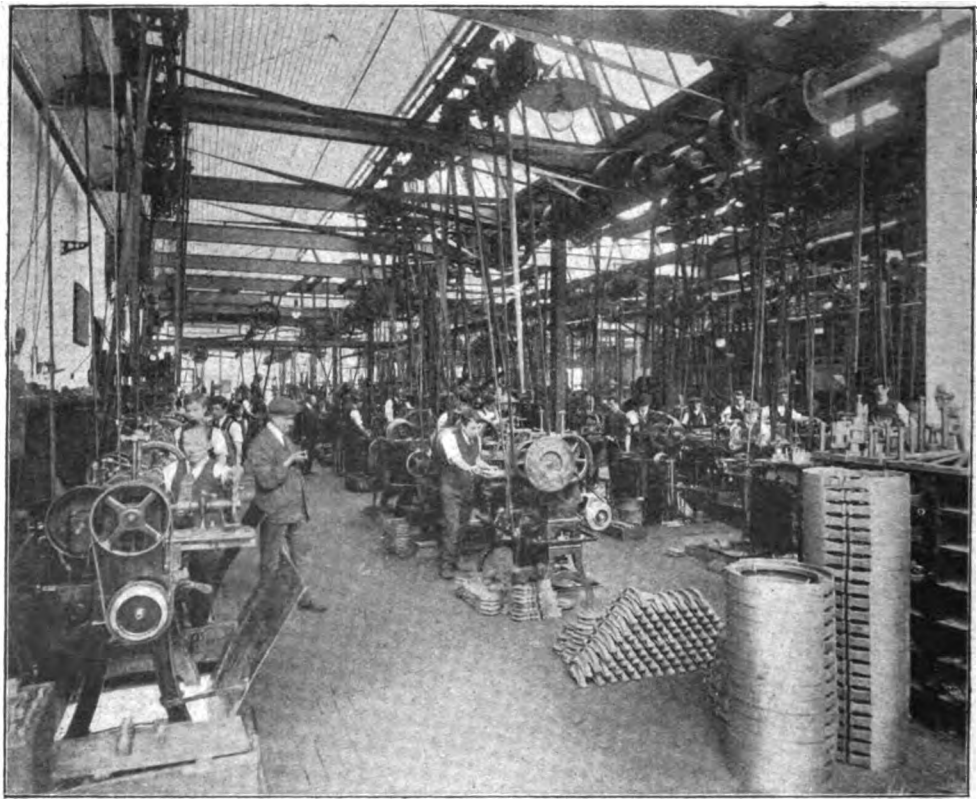
number of women have qualified for using easier machine tools to compensate to some extent for men who have joined His Majesty's Forces to the number of nearly 400.

As already indicated, the family of Napier has for several generations made machinery for Royal and other Mints, and the microscopic fineness of correction which is there essential has been adopted as a standard also in the production of Napier motor cars. From the moment when a bar of steel is drawn from the store, marked with a different colour to avoid possibility of error, to the time when the finished car has passed its trials and been sent out, every part is tested over and over again to ensure that it shall not vary by a fraction of an inch from the standard. The mere superficial measurements of the workshop are not enough. Between every two operations each part is returned to a special department to be scientifically tested for errors of size.

One result of this is that all parts are interchangeable between cars of the same pattern, and can be replaced at a moment's notice. Another point is that once an improvement has been made and perfected, it is standardised and forms an integral part of every future car.

A second feature of the practice of this firm is the care taken to provide an ample margin of safety throughout. The camshaft, the live axle gear wheels, and all other important parts that have to bear heavy stresses, are milled out of the solid bar.



ONE OF THE MACHINE SHOPS.

A further point is that accessibility is an outstanding feature in Napier design which conduces to rapid adjustment or easy dismantlement when attention is necessary.

To ensure noiseless running of gears all gears are run in mesh together upon a test bench until they are absolutely silent.

Entering the main gates, the administration building first calls for attention. Here, on the ground floor, are various office departments, one group being devoted to the staffs of the Works Manager and Assistant Works

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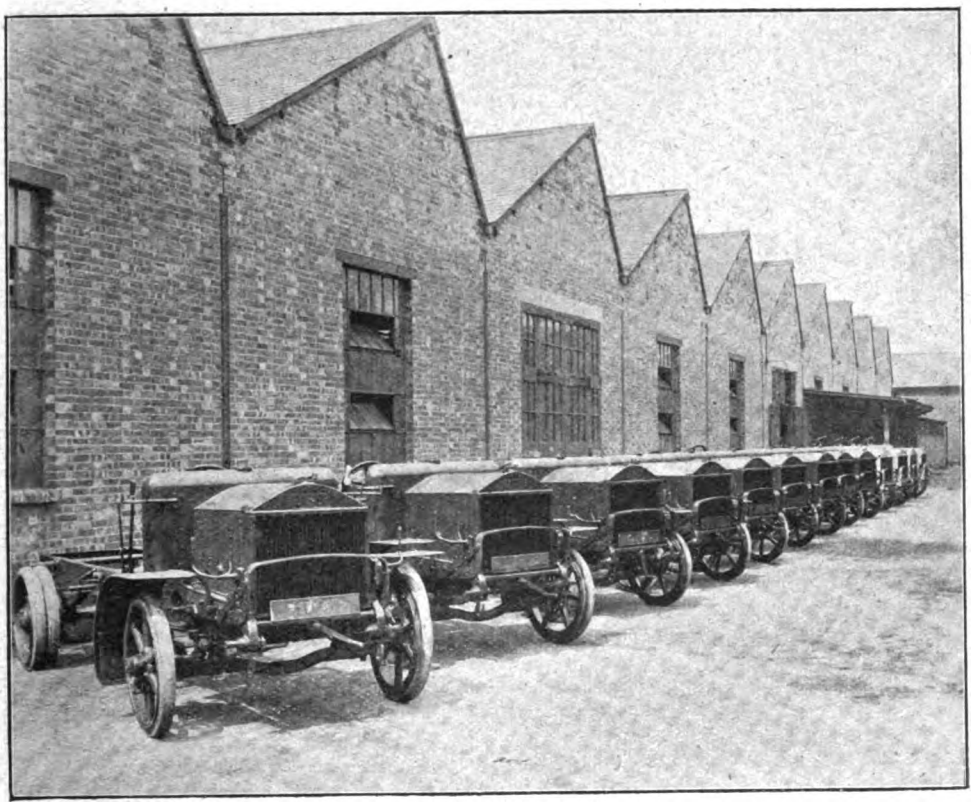
Manager, and others to purchasing, the costs clerks, etc., together with the private offices of Mr. M. S. Napier and of the Managing Director, Mr. H. T. Vane, and a special experimental department. Above is the drawing office, normally utilising the services of about 40 men, and alongside are the Secretary's and Accountant's departments, with their staffs. Sales are usually dealt with at the palatial Show Rooms in New Burlington Street, Regent Street, W.

The main building is first entered through a few years ago, increases to nearly three times the area available for machinery. Taken as a whole, the main machine shop includes about 300 machine tools. The principle of machine classification is adopted in preference to that of work classification; and, therefore, one finds, in the old shop, mainly drills of various kinds (largely radial arm, multiple and large single designs), and planing and like machines.

Other parts of the shop include rows of smaller drills, turret and semi-automatic



CHASSIS FOR A GOVERNMENT ORDER FOR NAPIER VANS IN THE YARD AT THE NAPIER WORKS.

the "rough stores" department. Here all raw material, steel bars and billets, brass and other metal supplies, etc., are received, for issue to the works. Adjacent is a section where preliminary work is done, such as cutting up large steel billets into sections to constitute blanks for individual machining, and other operations required to transform raw material into units suitable for shop work.

The first portion of the main shop entered is the old machine section, which sufficed until the rapid growth of output necessitated, lathes, boring and facing machines, vertical and horizontal millers (large and small), ordinary lathes, automatic and semi-automatic machines for making studs and bolts and other details, gear wheel cutters and the like, all grouped according to type of machine, but engaged in many and varied duties. To one side of the machine shop is the rough grinding department, where a great deal of preliminary finishing off work is done. A section of the machine shop includes a very comprehensive "fine grinding" equipment, where the final touches are given, ensuring

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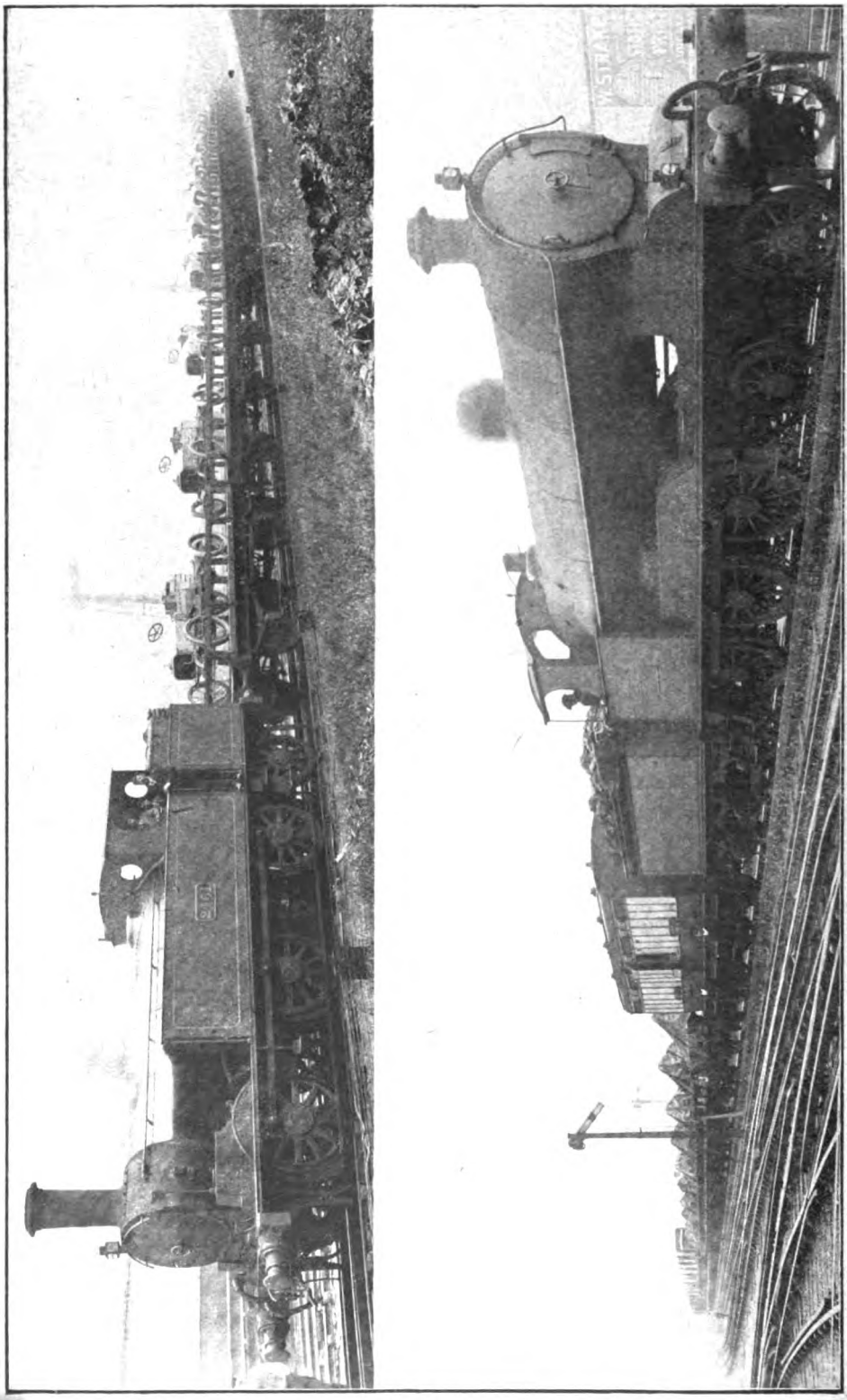

SPECIAL TRAINS CONVEYING NAPIER LORRIES AND AMBULANCE CARS FOR SHIPMENT TO ONE OF OUR ALLIES. (a) MARSHALLING. (b) READY TO LEAVE.
All these cars reached their destination safely and have since given great satisfaction to the purchasing Government.

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the wonderful micrometric accuracy necessary to allow of working to thousandths of an inch upon which the firm prides itself, as well as for giving the beautiful polish which is not only a sign of first-class workmanship but also a factor in realising efficient working and reliability of the finished machine. Grinding and buffing machines are all fitted with draught ducts for removing ground-off material. As an evidence of the scrupulous accuracy aimed at by Messrs. Napier, it may be noted that cylinders are finally ground to accurate dimensions with water circulating through the jackets, so as to obtain substantially working conditions.

Operations carried on include heavy work such as machining cylinders, crank shafts, differential gear casings, frames, etc., and detail work such as valves, valve springs, piston rods, cam shafts, and the hundred and one details of a motor car. Parts that receive the greatest strains and upon which most dependence must be made are in many cases machined directly from the solid, this being a desirable course in numerous instances, notwithstanding that it may involve an apparently needless waste of material. This practice ensures that the homogeneous character of the metal as received in bar or billet is not destroyed and avoids risks of the development of fractures and flaws. Cam shafts are thus machined from bars of "extreme cam radius" diameter, being dealt with first in various lathes and finally shaped by special machines controlled by pattern cams and shaping entirely by rough and fine grinding. A special machine for testing and correcting the balance of every crank shaft may also be noted.

A GROUP OF NAPIER VANS SUPPLIED TO THE WAR OFFICE.

Adjacent to the main machine shop is a tool and experimental room, an extensive department including a large number of machines. Here not only are shop tools made and kept in condition, but gauges and jigs for shop use are also prepared from the "master gauges" kept in a special department. As there are nearly 600 of these required to meet current work, and a number of these have to be duplicated or triplicated when several machines in the shop may be on the same work, the tool room has a good deal to do in this department, while a new design may

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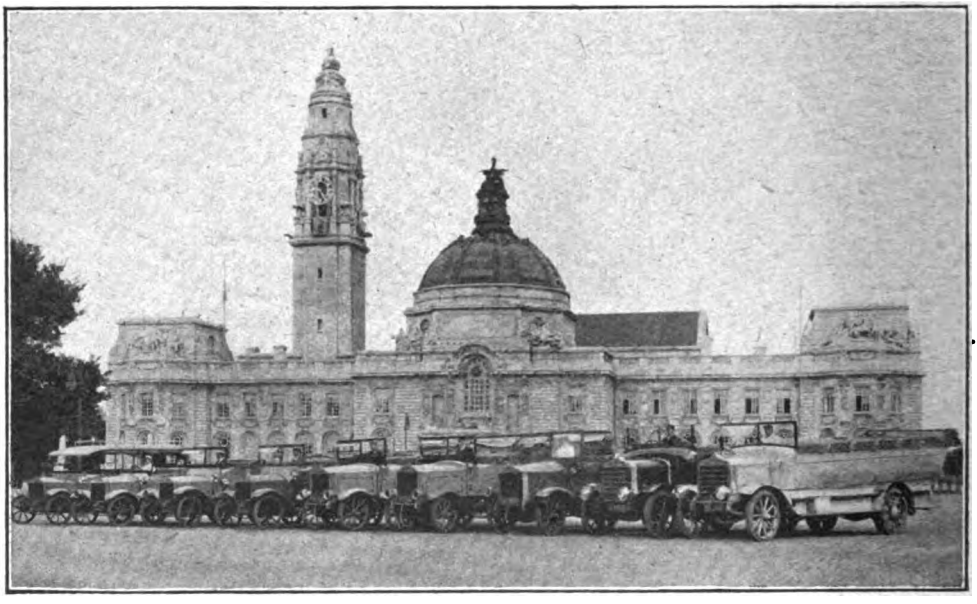
involve the preparation of a number of new gauges and jigs. Special experimental work is also done in this department, and Mint machinery is dealt with here.

Not far from the tool room is the marking off room, where blanks and partially machined parts are marked off for the guidance of the mechanics undertaking the next operation. Adjacent is the material testing department, and it may be noted that each and every crank shaft forging is supplied with a test piece which is in every case cut off and individually tested, instead of depending upon tests upon a few pieces taken from every supply.

The practice in the Napier Works is that every item from the machine shop goes into what is termed the "view room," where it is carefully gauged and examined to ensure that accuracy of machining is maintained from stage to stage, and that the material has suffered no deterioration in the process. In this department rigid tests of large number of parts are made by a Brinell hardness testing machine, gear wheels, steering gear components, etc., all undergoing verification here.

A score or so assistants are continuously employed in this section, for every part goes to the "view room" before it is subjected to a second machine shop operation; and it is from the "view room" that parts are issued to the finished stores, to be passed out eventually to the erecting shop.

This is a large building the bulk of which is arranged for what may be termed the "right-angle" method of assemblage. That is, while the main frame members enter at one end, details arrive at the same or proportionate time at the other ends of fitting and assembling benches arranged at right angles, so that in the first position the embrio chassis is fed by a series of details progressing along the initial assembling benches, and then as the chassis is moved along the second, third, fourth and other positions, other parts correspondingly reach the ends of the adjacent benches. The principal stages after the main frame members are assembled are (1) carburettors, (2) steering details, (3) exhaust details, (4) gear boxes, (5) engines, and (6) back axles.



NAPIER OBSERVATION CARS BEFORE THE TOWN HALL, BRISTOL.
Most of these vehicles have been since adapted for War Service.

Four vehicles can usually be erected abreast at each stage; while the eight stages provided for enable 32 to be in the shop at the same time. The remainder of the erecting shop is devoted to plate work, radiators, tanks, bonnets, etc. For much of this work electric welding is used in place of rivet connections. Here also are placed conveniently the coppersmiths and the brazing hearths.

Arranged around the main buildings are the pattern shop, the foundry, smithy and

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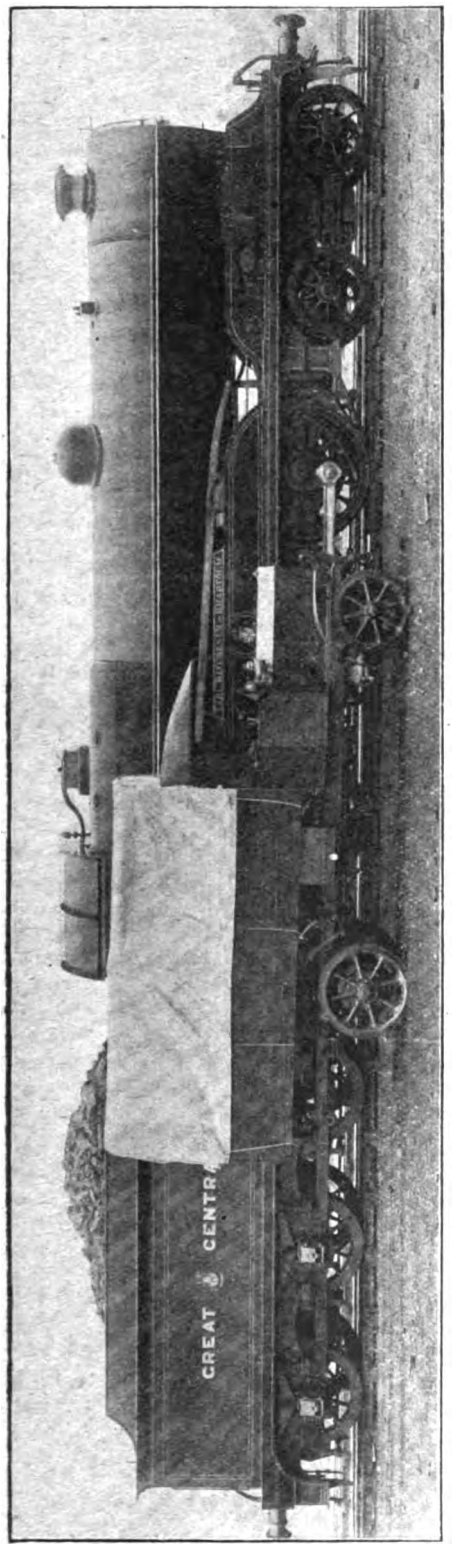

AN INTERESTING COMPARISON: "PARTNERS" OR "COMPETITORS"?

This view shows a Napier 3½-ton business vehicle standing alongside one of Mr. J. G. Robinson's well-known 4–6–0 superheater mixed traffic engines, No. 279, which bears the name of the late Earl Kitchener of Khartoum. A photograph of this engine was reproduced last month.

forge, paint shop, frame shop, engine testing house, the body and joiners' shop, the "running-shed" for cars receiving road tests, a large department (with stores) devoted to the overhaul of cars requiring attention after continued service, and the new car department where fittings and final equipment are provided. A spray water cooling pond for condensing water for the steam engine, hardening and annealing furnaces (with elaborate electrical temperature-recording devices connected to the oil and gas furnaces used for special parts), and impregnating bins using leather cuttings and clay for case-hardening in the furnaces, may also be noted.

No machines are direct motor-driven; but all power is electric, through motors placed in various positions and operating groups of machines.

A part of the current required for power and lighting is obtained from the local supply, but to ease the demands, which would otherwise be considerable, and to render the works independent in the event of a breakdown, a private power station has been for many years installed. The engine house includes two Lancashire boilers, while the engine, a 250 h.p. horizontal compound, drives directly a Westinghouse direct-current generator. In addition, there is a 250 h.p. vertical Diesel engine driving a similar generator, this and the steam engine serving normal demands, while a gas engine running a third generator serves as a stand-by.

Alongside the machine shop is a covered roadway the side of which is used for general purposes, while the remaining space enables cars to be given running tests when it is not necessary or desirable to send them out on to the public roads. Throughout the works area and into and out of the various departments is a system of overhead telpher railways, and this is of great value in facilitating transfer of heavy materials and parts from department to department.

In conclusion it may be mentioned that the normal business of the Napier Company consists of six-cylinder models, 20 h.p. "Colonials," and two types of business vehicles, viz., 30–45 cwt. and 3½ ton. These must be subdivided into home service and "Colonial" vehicles, the latter being designed to meet the harder conditions involved by work in colonial and up-country districts.

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# RAILWAY PORTRAIT GALLERY.

*Photo*] [*Elliott & Fry.*

## MR. RALPH COPE,

**Chief Accountant, Great Western Railway.**

MR. RALPH COPE has been appointed Chief Accountant of the Great Western Railway, on the retirement of Mr. G. J. Whitelaw. It will be remembered that a few months ago Mr. Cope was appointed principal assistant to Mr. Whitelaw, on the resignation of Mr. Edward Wells, who for some time had been associated with Mr. Whitelaw as Joint Chief Accountant. Mr. Cope was born in September, 1862, and entered the Company's service as a lad clerk in the Chief Accountant's office in January, 1877. At stages of his career he became, successively, head of the funds department, head of the paybills department, supervisory chief of the paybills, staff, and cash audit sections, head of the joint department, and in 1910 was appointed chief clerk. In 1912 he received an expression of appreciation by the Board of Directors for valuable services rendered in connection with the reorganisation of the hotels and refreshment rooms department's accounts.



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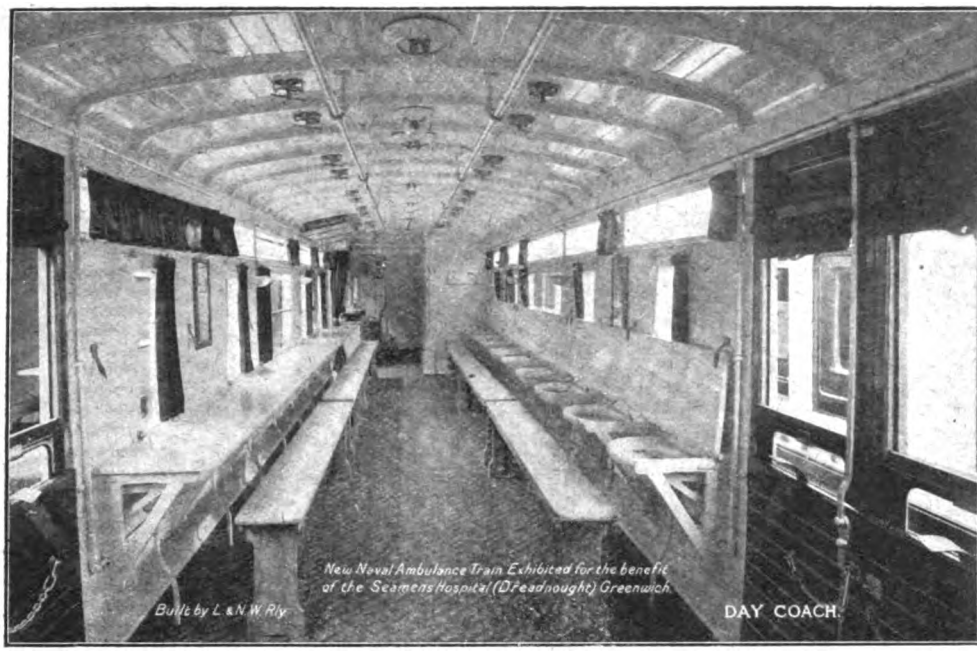
New Naval Ambulance Train Exhibited for the benefit of the Seamens Hospital (Dreadnought) Greenwich
Built by L. & N.W. Rly.
DAY COACH.

INTERIOR OF DAY COACH, WASHING BASINS ARRANGED FOR USE TO THE RIGHT, TABLES LOWERED FOR MEALS AND GENERAL PURPOSES TO LEFT.

# British Naval Ambulance Train.

## Equipped by the London and North Western Railway.

IN the July number brief reference was made to a naval ambulance train exhibited, by the courtesy of the Lords Commissioners of the Admiralty, at Kensington (Addison Road) station on Whit-Sunday and Whit-Monday, 11th and 12th June. The train was shown fully equipped and staffed as for use in conveying sailors and marines on arrival from the Fleet. The charge for admission was 1s., the whole of the proceeds being devoted to the welfare of the sick and wounded naval ratings under treatment in the Dreadnought Seamen's Hospital, Greenwich.

The train was in two sections, one placed on the extreme south-east platform, and the other on the centre road adjacent to the line used by Metropolitan electric trains from Addison Road. Visitors entered the platform section, and after passing through the vehicles there crossed by a gangway into the other section, returning therethrough and leaving by a gangway across the buffer stops from the vestibuled end.

Seeing that this train differs essentially in many respects from those for military use already described, two photographs are now reproduced, together with fuller particulars of the train, which is one of those equipped by the London and North Western Railway.

A standard naval ambulance train consists of twelve vehicles arranged in the following order: A coach for baggage and guard, a staff coach, dining car, cot coach for officers, three cot coaches for patients, a store coach and kitchen, day coach for patients, two cot coaches for patients, and a crew coach and guard. The length of the train is about 620 ft., and the width is generally 8 ft. 6 in., while the weight is about 310 tons.

Instead of berths patients are received from hospital ships in the hanging cots therein used, a balance being kept by replacing each cot received by one from the train equipment. These are hung in two tiers on either side but occasionally very serious cases are suspended centrally, so as to be almost entirely unaffected by the vibration of the train. The cots are suspended from hooks attached to the roof and are further secured in position by chains and



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springs, known as gripes, which prevent them from swinging while the train is in motion.

The train is electrically lighted, and in order to economise current when the train has to stand by for some time, nearly every lamp is under separate control. Steam heating equipment is provided, but as this can, of course, only be used when train is running, the living quarters of the crew and staff are fitted with a heating apparatus that can be used when train is stationary, as it is sometimes for a day or so. The train is painted "Navy Grey," with a red Geneva cross on each vehicle in a conspicuous place, while within enamelled white paint prevails. All internal ironwork and insides of gangways are painted with aluminium paint.

COTS IN THE NAVAL AMBULANCE TRAIN.

This photograph illustrates the officers' section, but the cots are similar, except for the curtain, in the general coaches. These cots are transferred with the patients from Hospital Ship to train, or *vice versa*, empty cots being exchanged therefor to maintain a correct distribution.

Both vacuum and Westinghouse brakes

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are fitted. The train has living accommodation for thirty-eight sick berth staff all in charge of a medical officer, who has his living quarters in the staff coach, while 140 sick and wounded are accommodated in six cot coaches.

All floors are laid with linoleum, with coved angles in all corners. Lavatories have solid terrazzo mosaic floors with a plug in the centre to facilitate washing out, etc. Each is fitted with a special water sealed w.c. pan and flushing cistern, and large-capacity overhead water tanks and the usual wash basin and other appurtenances. The staff coach includes living quarters for the medical officer, and has accommodation for the chief surgeon, two doctors, and two sisters. The compartments are arranged: A bed sitting room with lavatory accommodation at one end for the two sisters; next are two bedrooms with wardrobes, table, etc., for medical officers, and these rooms are placed each side of a well-equipped bath-room and lavatory.

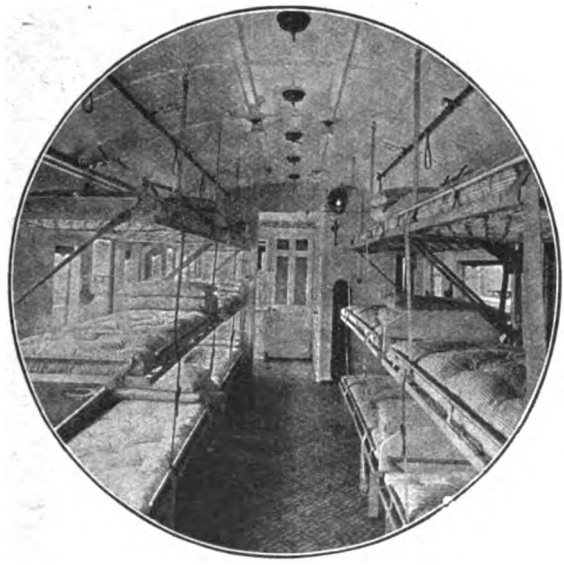
The store coach consists of an office for officer in charge, linen store, two store rooms for provisions, sleeping accommodation for chief steward and cook, and a large kitchen fitted with all accessories for cooking for the 140 patients.

The day coach is used by patients for dining and ablution purposes. At one end are two padded cells for mental cases, and opposite these are cupboards for medical stores. The day room has nineteen wash-basins, and is fitted with seats, looking glasses, etc., and above the wash basins are folding tables which rest on tops of basins and are used for dining tables. Sleeping and living quarters for the crew are in the crew coach, and here are fifteen bunks in tiers of three, with tables and forms, and a locker for each man's kit.

Telephonic communication exists throughout, and breakdown tools and fire extinguishers are distributed along the train.

A peculiar feature of cars where patients who can get about are conveyed, is that the cots are disposed to form a long seat along one side of the coach only, the remaining floor space being clear. This is to meet a navy habit of sitting "on the deck" when not otherwise engaged, the floor being often preferred to the seats.

A set of five picture postcards showing views of this train can be had, price 6d., from the Secretary of the Seamen's Hospital Society, Greenwich.



INTERIOR OF A MILITARY AMBULANCE CAR: LONDON AND NORTH WESTERN RAILWAY.

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# British Railway Personnel.

## Important Staff Changes on the London, Brighton and South Coast, London and North Western and Great Western Railways.

EACH turn of the half year occasions changes among leading members of the staffs of the principal railway companies, and several notable recent instances may be grouped for review.

Mr. Frederick Walker, Assistant Manager of the London, Brighton and South Coast Railway, retired on June 30th, after 44 years' service with the "Brighton" Company. He commenced his railway career in 1866 as a clerk for the Cheshire Lines Committee. In 1869 he entered the service of the Great Western Railway, joining the staff of Mr. Grierson, the General Manager. In 1872 he joined the Brighton Railway, being private secretary to two consecutive General Managers, from 1875 to December, 1896, when he was promoted to chief clerk of the General Manager's Office. He was appointed Parcels Manager in 1905, and in July, 1910, became Assistant Manager under Sir William Forbes, the present General Manager. During his many years with the "Brighton" Company Mr. Walker has had considerable experience of Parliamentary work in assisting the General Manager in connection with Bills promoted by his own and other companies. Mr. Walker celebrates this year his jubilee in the railway service. During his total of 50 years' railway experience he has witnessed many important railway improvements and has many pleasant and interesting reminiscences.

MR. FREDERICK WALKER.
Late Assistant Manager,
London, Brighton & South Coast Railway.

Mr. E. J. Readdy, Chief Clerk, succeeds Mr. Walker as Assistant Manager. Mr. Readdy joined the service of the London, Brighton and South Coast Railway as a Junior Clerk in the General Manager's Office in the days of the late Mr. J. P. Knight, and after having gained experience in various departments, became private secretary to the late Mr. J. F. S. Gooday on that gentleman being appointed General Manager of the Brighton Railway in January, 1898. On the return of the latter to the Great Eastern Railway, Mr. Readdy continued to occupy the same position with Sir (then Mr.) William Forbes, who succeeded Mr. Gooday. Six years ago he was promoted to Chief Clerk in the General Manager's Office, and now succeeds Mr. Walker as Assistant Manager.

Consequent upon the retirement of Mr. J. W. Beaumont, Outdoor Running Superintendent, Northern Division, Chief Mechanical Engineer's Department, London and North Western Railway, Mr. W. H. B. Jones has been appointed Running Superintendent for both the Southern and Northern Divisions.

Mr. J. A. Bowes becomes Mr. Jones's Chief Assistant in the Southern Division, and Mr. W. F. Black Chief Assistant in the Northern Division.



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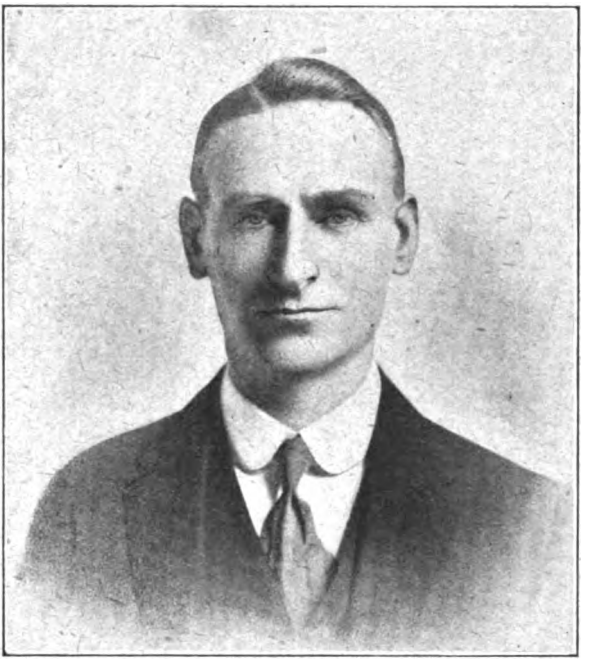
Mr. W. H. B. Jones, whose portrait is reproduced by courtesy of our London and North Western contemporary, entered the service of the London and North Western Railway at Crewe as a Premium Apprentice in September, 1871, and in 1876 was appointed Junior Outdoor Assistant to Mr. T. W. Worsdell, then Manager of Crewe Works. He subsequently took up work in the Running Department at Rugby, Burton, Colwick, and Birmingham, returning to Crewe as Chief Locomotive Foreman and Assistant to the Running Superintendent in January, 1890. After holding this position for 12 years, Mr. Jones was, in February, 1902, appointed Assistant Running Superintendent, and in March, 1909, was promoted to Running Superintendent of the Southern Division. He now becomes Running Superintendent for the whole of the line.



MR. E. J. READDY.

Who succeeds Mr. Frederick Walker as Assistant Manager, London, Brighton and South Coast Railway.

Mr. Walter Young Armstrong, M.Inst.C.E., New Works Engineer, Great Western Railway, who retired on June 30th, has been concerned in many of the important engineering undertakings associated with the modern history of the Great Western Railway. A son of the late Mr. John Ward Armstrong, divisional engineer at Hereford, he was born in 1851 and educated at Carmarthen Grammar School, the Hull and East Riding College, and King's College, London. In 1870 he became an articled pupil in the offices of his father, and at the age of twenty-four was appointed resident engineer in Wales, with offices at Swansea. In 1883 Mr. Armstrong was appointed principal assistant to Mr. W. Lancaster Owen, who was assistant engineer to Mr. W. G. Owen, the Chief Engineer. On the death of Mr. W. G. Owen, the post of Chief Engineer lapsed until 1891, when Mr. Armstrong was appointed Assistant for Construction, and in 1904, when the late Sir James Inglis became General Manager he became New Works Engineer.

Mr. Frederic Gleadow, M.Inst.C.E., is retiring from the position of Principal Iron and Steelwork Assistant to the Chief Engineer at Paddington, Great Western Railway, owing to ill health. He was educated at Clifton College, Bristol, and Owens College, Manchester, and articled to the late Mr. John Fraser, M.Inst.C.E., Leeds. After completing his engineering training he acted as resident engineer for the construction of the lines from Thornton to Keighley and from Sutton to Willoughby, which now form part of the Great Northern Railway. At a later date Mr. Gleadow was engaged as assistant engineer on the contractor's staff in connection with the construction of the Forth Bridge. He then took up private practice at Westminster as consulting engineer, until in 1904 he joined the staff of the Great Western Railway, in the position he is now vacating.

Mr. Alfred Chorley Cookson, M.Inst.C.E., has been appointed to succeed Mr. Gleadow as Steelwork and General Assistant at Paddington. Educated at Rossall School, he obtained a scholarship at the City and Guilds of London Technical College in 1885, and the Diploma of Associate of the College in 1888. Mr. Cookson completed his engineering training at the works of Messrs. J. & G. Rennie, London, and in 1891 obtained an appointment as draughtsman at Messrs. Joseph Westwood's Iron and Steel Construction Works, Millwall, where he remained until 1894, when he entered the service of the Great Western Railway as an assistant on the staff of the New Works

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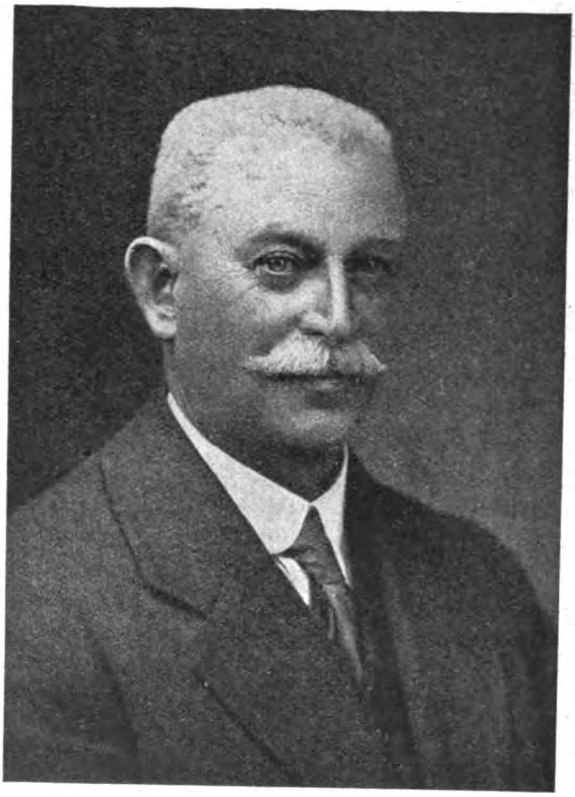
section of the Chief Engineer's Office. Later he was appointed chief assistant to the divisional engineer at Gloucester.

Mr. Raymond Carpmael, Assoc.M.Inst.C.E. and M.Inst.Mech.E., Chief Assistant to the Divisional Engineer, Shrewsbury, is transferring to Gloucester to take the place of Mr. Cookson. He served his pupilage with Messrs. Stothert & Pitt, Ltd., Bath, and entered Great Western service in 1900, as Assistant in the Chief Engineer's office, Paddington, becoming Chief Assistant at Shrewsbury in 1909. Mr. Alfred Arthur Davis, Assoc.M.Inst.C.E., succeeds Mr. Carpmael at Shrewsbury. He was a pupil of Mr. H. U. McKie, 11, Victoria Street, Westminster, and after some years' experience on various important engineering works entered the service of the London and North Western and Great Western Joint Committee in 1903. For six years Mr. Davis acted as Chief Assistant to the late Mr. R. E. Johnston, engineer to the Joint Committee; and when the maintenance of the Joint Lines was taken over by the parent companies on the retirement of Mr. Johnston at the end of 1908, Mr. Davis was attached to the staff of the divisional engineer at Shrewsbury, as second assistant.



MR. W. H. B. JONES.
Running Superintendent,
London and North Western Railway.

Captain George Harper, Assistant Horse Superintendent, Great Western Railway, whose retirement is announced, commenced his railway career in the Divisional Superintendent's Office at Birmingham in 1866. Four years later he was transferred to the Goods Department at Hockley, and in 1870, when the Horse Department was constituted, he was attached to that Department. In 1883 he removed to Paddington, and in 1895 was appointed assistant to the Horse Superintendent, and was subsequently made Assistant Horse Superintendent in 1897.

Another notable retirement from Great Western Railway service is that of G. J. Whitelaw, the Chief Accountant. His railway career dates from 1863, and the whole of it has been spent in the Accountants' Department, Paddington. He early rose from the ranks, becoming Chief Clerk in 1890 and succeeding to the position of Chief Accountant in 1897. In addition to being Chairman of the Accountants' Sub-Committee of the Railway Executive, among other activities Mr. Whitelaw was a prominent member of the Department Committee appointed by the Board of Trade in 1909 to inquire into the accounts and statistical returns rendered by railways. It was on the findings of this Committee the Railway Companies (Accounts and Returns) Act, 1911, was based. Mr. Whitelaw is succeeded by Mr. Ralph Cope, particulars of whose career are given on page 98.

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# Locomotive and Train Working in the latter part of the 19th Century.

## THE GREAT WESTERN RAILWAY (Standard Gauge). [No. VI.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

(*Continued from page* 26, *July* RAILWAY MAGAZINE.)

THE Shrewsbury and Hereford section was until 1888 merely a cross country branch, albeit of great importance for coal traffic. Being a joint line, the other partner (the London and North Western Railway) worked some of the trains. The fastest train until 1888 was the 2.10 p.m. from Shrewsbury, which covered the 50¾ miles in 1 hour 35 min. with three stops. All the other fast trains in both directions had from four to seven stops and took a correspondingly longer time.

In the summer of 1888 the Great Western Railway sprang a surprise on the Midland, by the introduction of a new and excellent North and West service between Bristol and Shrewsbury *viâ* the new Severn Tunnel. At Shrewsbury the trains were divided and the larger portion was taken over by the London and North Western Railway for Manchester or Scotland, and one train each way even had a through coach for Leeds. Hitherto the Midland had had a complete monopoly between Bristol and the North, but from this time it was boldly challenged. There were four expresses in each direction, of which two took 3 hours from Bristol to Shrewsbury and two others 2 hours 57 min. The up trains from Shrewsbury to Bristol took from 3 hours to 3 hours 5 min. The following was the schedule of the best trains in each direction :—

The trains were heavy, for they consisted of a profusion of through coaches from everywhere to everywhere else. The Bristol portions had through carriages from Plymouth and Torquay to Manchester (London Road) and Birkenhead; two trains had carriages from Bristol to Glasgow and to Edinburgh, and the 12.30 p.m. had one to Leeds. At Pontypool Road there were attached coaches from Cardiff for Manchester and Birkenhead, and, if I remember rightly, there were also coaches for Liverpool (Lime Street, London and North Western).

Moreover the road is one of the hardest in the kingdom for through main line express trains. After leaving Stapleton Road station (Bristol) there is a 2 mile rise of 1 in 75, and from Patchway a fall of nearly 7 miles of 1 in 100 to the middle of the Severn Tunnel, followed by a 3 mile rise of 1 in 90 to Severn Tunnel Junction. The line then undulates at moderate gradients to Maindee Junction, soon after passing which the rise to Pontypool Road summit is 9 miles of 1 in 126 to 1 in 96, followed by a 6 mile descent at 1 in 104 to 1 in 80 with the exception of a short rise in the middle. From Pempergwm there is a climb of 1 in 82 to Abergavenny, succeeded by 1 in 82 to 1 in 95 to the summit at Llanvihangel, a total rise of 9 miles. Then follows a 6 mile fall of 1 in 100 to near Pontilas. The last

| UP. | | | | | | DOWN. | |
|---|---|---|---|---|---|---|---|
| Speed. | Miles. | | | | | Miles. | Speed. |
| m.p.h. | | p.m. | | | p.m. | | m.p.h. |
| 41·2 | 119½ | 3.30 a. | .. | Bristol .. .. | d. 12.30 | — | — |
| — | — | 2.39 d. | .. | Pontypool Road .. | a. 1.21 | 35 | 41·2 |
| 41·4 | 84½ | 2.34 a. | | | d. 1.26 | — | — |
| — | — | 1.46 d. | .. | Hereford .. .. | a. 2.14 | 68⅝ | 41·4 |
| 44·1 | 50⅞ | 1.41 a. | .. | | d. 2.19 | — | — |
| — | — | 12.33 d. | .. | Shrewsbury .. | a. 3.27 | 119½ | 44·1 |



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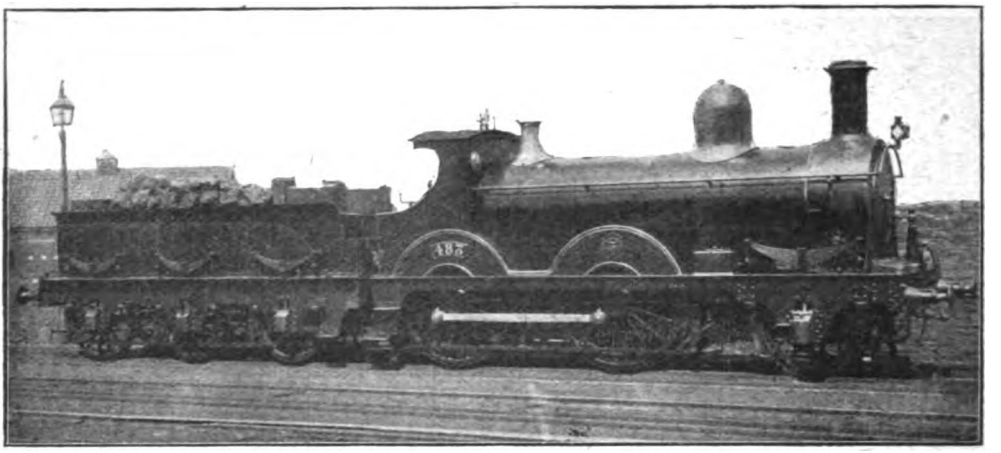

NO. 483 (481–490 CLASS), REBUILT AT SWINDON, 1887–8.
Coupled wheels, 6 ft.; cylinders 17 in. by 24 in.

5 miles into Hereford are on a falling gradient of 1 in 105.

From Hereford to Ludlow the line rises generally but is undulating. There is a rise of one mile of 1 in 100 at Dinmore, and a fall of about 1 mile of 1 in 115 to 1 in 100 near Woofferton, followed by a 2½ mile rise varying from 1 in 112 to 1 in 220 to Ludlow. From Ludlow to 1½ miles south of Church Stretton a length of 14 miles is an almost continuous ascent in which gradients of 1 in 100 to 1 in 112 exist in various lengths for 6½ miles. From this point to Shrewsbury is a continuous and steep descent for 13½ miles, a very large proportion being 1 in 90 to 1 in 100. A full account of the Shrewsbury and Hereford Railway, with gradient profiles, was given in the RAILWAY MAGAZINE of January, 1908.

In addition to the severe banks the old Dinmore tunnel, about 7 miles north of Hereford, was another obstacle, for this was then provided with only a single line (though it has since been doubled).

Despite the severe nature of the road the engines employed from 1888 for a number of years were of comparatively small size with 17 in. by 24 in. cylinders. It is remarkable that the Great Western Railway did not make 18 in. by 26 in. cylinders for coupled engines standard until 1895, although the majority of other railways had been using them for nearly 20 years, and had by that time increased their cylinders to still larger sizes.

The Bristol engines which worked two of the trains each way to Shrewsbury were the rebuilt 481 class, and had originally been

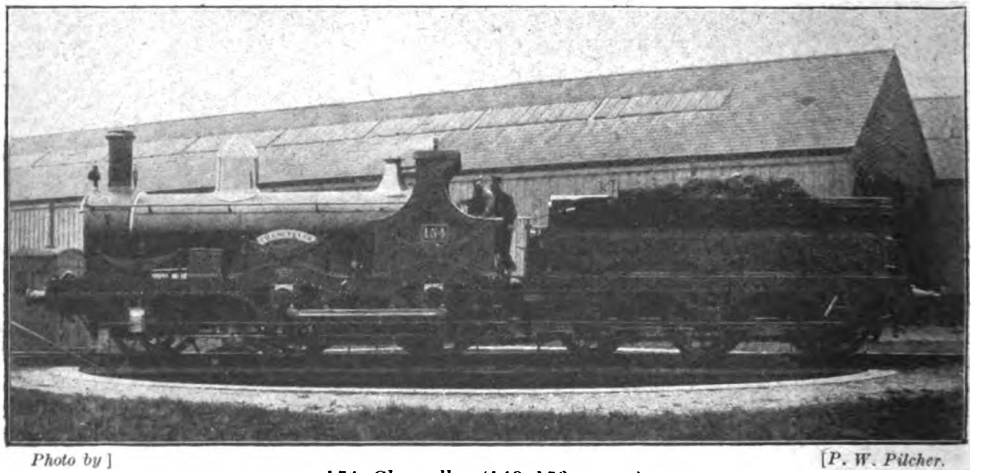

*Photo by* [*P. W. Pilcher.*

NO. 154 *Chancellor* (149–156 CLASS).
Coupled wheels, 6 ft. 6 in.; cylinders, 17 in by 24 in.

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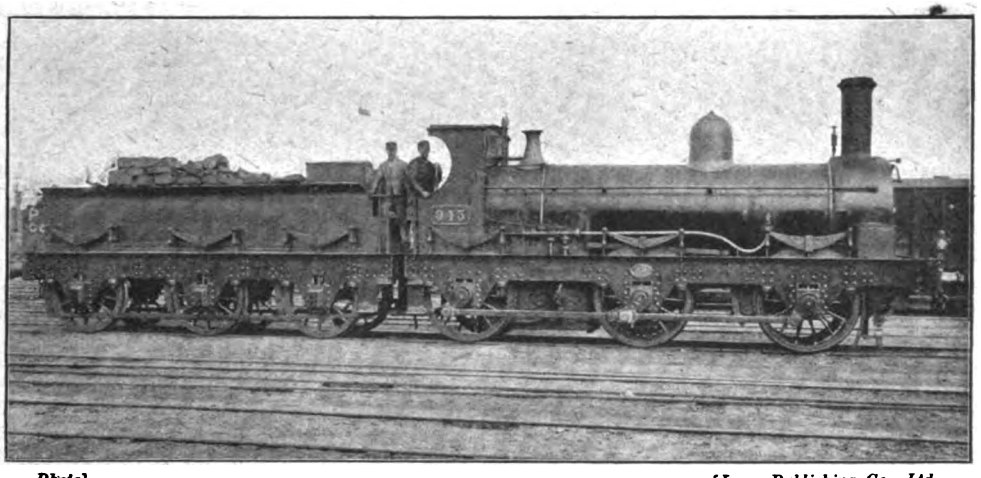
the small engines running over the Berks and Hants and Bristol–Salisbury branches. They were, however, considerably improved when they were rebuilt at Swindon in 1887–1890. The coupled wheels were, as before, 6 ft. diameter, but the new cylinders were 17 in. by 24 in. and the pressure 150 lbs. in some of them. The total heating surface was 1,200 sq. ft., of which the firebox was responsible for 105 sq. ft. They had inside frames to the coupled wheels with outside axleboxes to the leading wheels.

On the other hand the Shrewsbury men, who also worked two trains in each direction through to Bristol, were provided with 6 ft. 6 in.-2–4–0 coupled engines of a totally different design. These were Nos. 149–152 with double sandwich frames, 17 in. by 65½ min., a gain of 2½ min. by the engine, with a load of 135 tons.

The night train in question had at one time a through Caledonian sleeping saloon from Scotland to Bristol. Whether this generally paid or not I do not know, but on one occasion I was the only passenger in it from Crewe to Bristol, and my presence did not help much financially, for having a pass, I was merely dead weight.

A very heavy coal traffic was carried between Pontypool Road and Birkenhead *viâ* Hereford and Shrewsbury, and a large number of engines were stationed at both places to work it. Those at Pontypool Road were of the 79 and 330 classes, the former being of the sandwich frame pattern with 4 ft. 6 in. wheels and the latter were rebuilt



*Photo]* [*Loco. Publishing Co., Ltd.*

0–6–0 OUTSIDE FRAMED GOODS ENGINE, NO. 945 (CLASS 927–946). BUILT AT SWINDON, 1874.
Coupled wheels, 4 ft. 6 in.; cylinders, 17 in. by 24 in.

24 in. cylinders, and 140 lbs. pressure. They were known as the "Chancellor" class, from the name carried by No. 154, and had been transferred from Wolverhampton for the special purpose of working the new North to West trains. The "Chancellors" were of somewhat ancient design, having been built in 1862 by the extinct firm of George England & Co., of Hatcham Ironworks, London, but they had been completely rebuilt at Wolverhampton in 1878–1883.

I had several trips both with and behind both classes, and found that they kept very good time. Engine 486 attained a maximum of nearly 71 miles per hour down the Church Stretton bank near Dorrington. On another occasion No. 149 ran the 2.25 a.m. night express from Shrewsbury to Hereford in "Beyer-Peacocks" with 5 ft. wheels and 17½ in. by 24 in. and 17½ in. by 26 in. cylinders. The latter were the only goods engines on the Great Western Railway, with one isolated exception, that had cylinders with 26 in. stroke. The Birkenhead engines were the 927–946 class, similar to Mr. Armstrong's standard 17 in. by 24 in. goods engines but with 4 ft. 6 in. instead of 5 ft. wheels.

In 1893 the passenger engines were replaced by the then new 3232 class of 6 ft. 6 in. coupled engines, with cylinders 17½ in. by 24 in., but in 1898 the Shrewsbury–Bristol expresses had become too heavy for these engines, and the 4–4–0 "Badmintons" were requisitioned for this service, several of them, 3300–3311, being stationed at both

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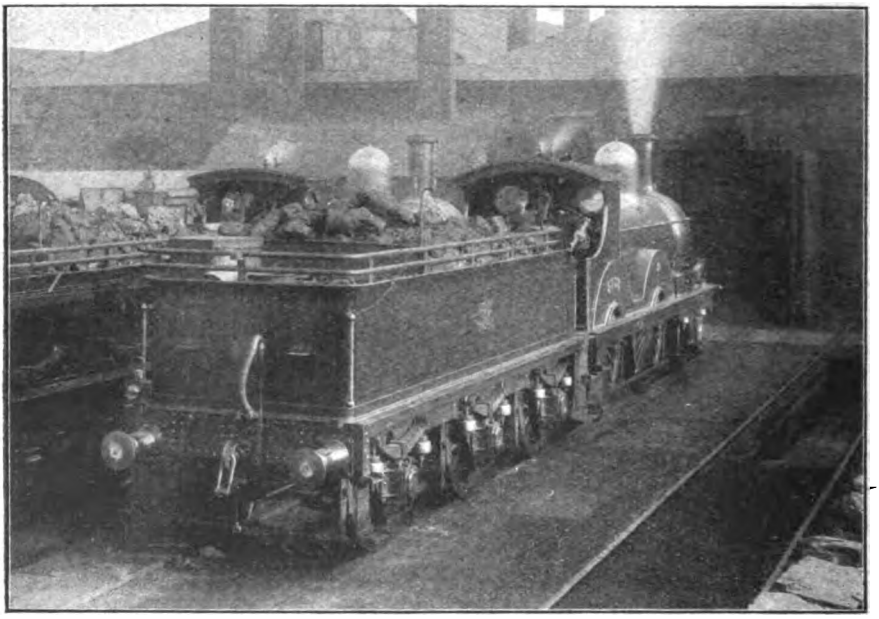
ends. They did excellent work on these trains.

The northern portion of the main line, *i.e.*, that from Birmingham to Birkenhead, now comes under consideration. Birmingham although the largest provincial city on the Great Western, was the least important of all so far as main line passenger engines were concerned, for there were only six allotted to Bordesley (Birmingham) shed. There were of course plenty of goods engines and an army of small tank engines for the local passenger services to Leamington, Wolverhampton, Dudley, Stourbridge, etc. The reason that Birmingham had to do without passenger tender engines was that the main line trains changed engines at Wolverhampton, which was, and still is, a more important locomotive station on the Great Western Railway.



NO. 3233. 2-4-0 ENGINE, SWINDON, 1892.
Wheels, 6 ft. 6 in.; cylinders, 17½ in. by 24 in.

The six passenger engines which served the needs of Birmingham for very many years were Nos. 718, 721-2-3-5-6, all 6 ft. 2-4-0 engines of the same series which has previously been mentioned in connection with Weymouth, where the other five of the class were quartered. With these the Birmingham men ran to Chester, and to Hereford; I am not sure whether they had one trip as far as Newport. They were not to be seen south of Bordesley, except on occasional trips to Leamington. The tank engines were of the well-known Wolverhampton 0-4-2 pattern, and of very small size. It is a curious commentary on Great Western Railway practice that whilst Swindon constructed only 2-4-0 tank engines for local traffic, Wolverhampton adhered entirely to the 0-4-2 variety. Both classes had the same sized coupled wheels (5 ft.), and cylinders 16 in. by 24 in. Moreover, the Southern division 2-4-0 tank engines were never seen in the Northern division, unless one or two working from Hereford to Worcester (which came through from Cardiff) are excepted. On the other hand the Wolverhampton-built 0-4-2 engines, of which there were 156, were to be found on branch lines all over the Great Western system from Birkenhead to Penzance. But the Birmingham district was the one in which they flourished.

The express train service between Wolverhampton, Shrewsbury, Chester and Birkenhead left much to be desired. There were a number of "fast" trains, and a good many exceedingly slow ones, but only one real express in each direction. This was the "Northern Zulu" or "Afghan," the running of which between London and Wolverhampton has been previously mentioned.

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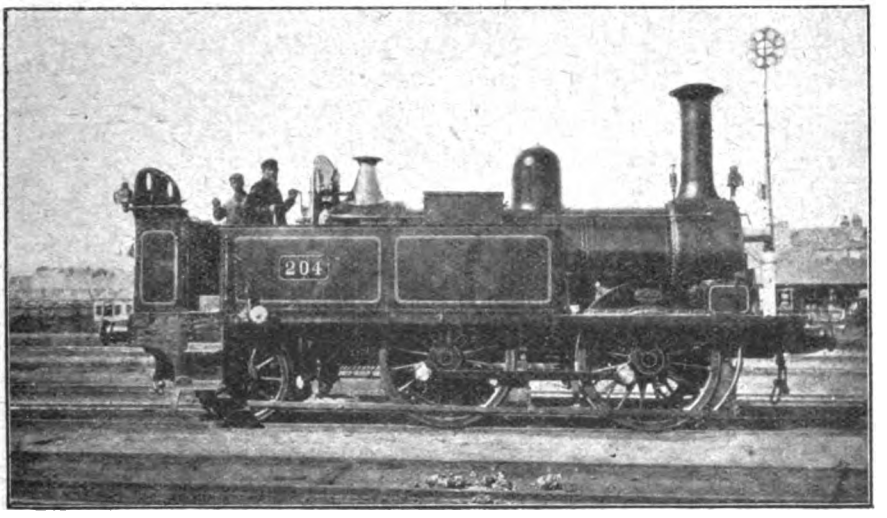
It was timed in 1880 as follows :—Wolverhampton dep. 7.51, stop at Wellington at 8.19, and arrive Shrewsbury at 8.33 p.m., Birkenhead arr. 10.2 p.m., with intermediate stops at Gobowen and Wrexham. The Chester portion was detached at Wrexham, for the train then ran direct to Birkenhead round the west curve at Chester. Afterwards the Wellington stop was omitted and the train was booked to leave at 7.52 p.m. and reach Shrewsbury, 29½ miles, at 8.32, a speed of 44·6 miles per hour. It was also accelerated north of Shrewsbury, and ran from there into Chester station, 42¼ miles, in 55 minutes, speed 46 miles per hour. Leaving Chester at 9.33 it arrived at Birkenhead at 9.53 p.m., speed 44·3 miles per hour.

7 ft. singles which ran north of Wolverhampton, and the Birkenhead men had two turns, on one of which they worked the above expresses to Wolverhampton and back, and on the other they worked to Chester and Manchester (Exchange, London and North Western) *viâ* Warrington. My own experiences with these three "Sir Daniels" were confined entirely to the Manchester trains, and I am therefore unable to give any account of their performances on the "Northern Zulu."

All the other trains between Wolverhampton and Chester were worked by four classes of coupled engines, two of which had 6 ft. 6 in. wheels, and two 6 ft. wheels. Wolverhampton shed had examples of all




0-4-2 TANK ENGINE, BUILT AT WOLVERHAMPTON.
Coupled wheels, 5 ft. ; cylinders, 16 in. by 24 in.

The time for the 228¼ miles from Paddington to Birkenhead was 4 hours 58 min. In 1888 the Wellington stop had been restored, and the train left Shrewsbury at 8.39 and stopped to detach the Chester coaches at Chester cutting, the booked speed from Shrewsbury being 50·6 miles per hour.

The up train from Birkenhead at 11.50 a.m. need not be considered in detail. Like the down train it avoided Chester by using the west curve, but made stops at Wrexham and Ruabon.

Both the up and the down trains were worked by the "Sir Daniel" class (rebuilt), three of which were stationed at Birkenhead. These were 378 "Sir Daniel," 473, and 578. They were the only Great Western Railway four, of which the rebuilt "Englands" or "Chancellor" class have already been mentioned. The other 6 ft. 6 in. engines were 806, 807, 810 and 821 of the same class that worked the Swindon and New Milford trains. 807 generally had a monopoly of the 1.30 p.m. express from Chester, and I had many experiences of this engine both on the footplate and behind her. My best record was from Chester to Wrexham, 12 miles 13 chains, in 20 min. 5 sec. with a load of 100 tons, but in this run the Gresford bank, 4 miles of 1 in 82, has to be climbed. I have also a note of the 25½ mile run from Ruabon to Shrewsbury with the same engine in 30½ min. and a load of 110 tons—speed 50·4 miles per hour. 807 worked this

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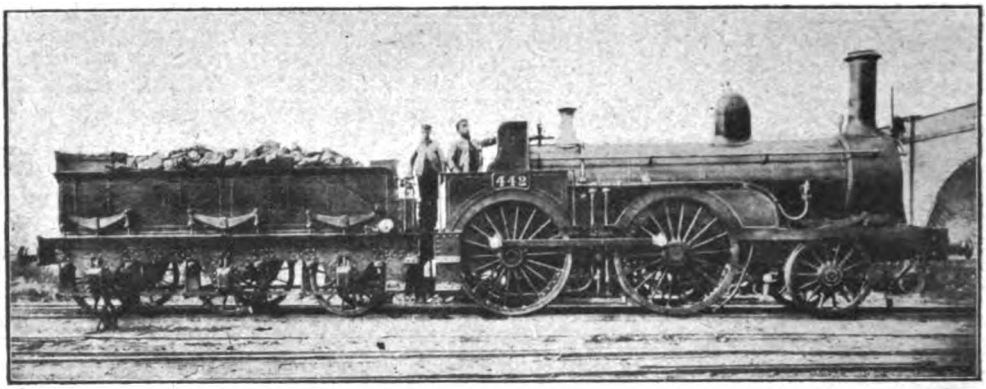


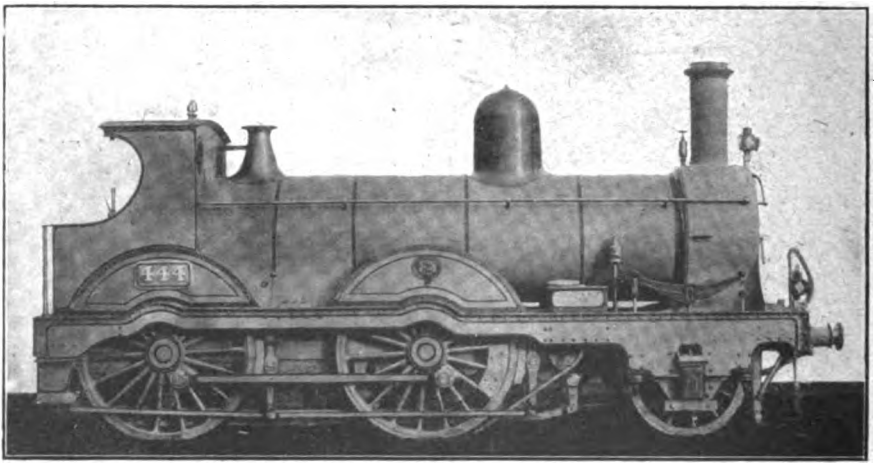
NOS. 439–444 ("BICYCLE" CLASS), SWINDON, 1868.

train from Chester to Shrewsbury for a good many years, except when under repairs, her place then being taken by one of the other three similar engines.

Of the 6 ft. engines the most prominent were Nos. 439–444. Originally these had been somewhat small engines with 16 in. cylinders, and the platforms along the side of the engines were bent round the coupled wheels after the style of the broad gauge coupled engines. They were the only narrow gauge engines after this fashion and their peculiar appearance earned for them the soubriquet of "Bicycles." In 1885–6 they were completely rebuilt at Wolverhampton, considerably enlarged, and given 17 in. cylinders, and also new outside frames for the leading wheels.

The other 6 ft. coupled engines were the double framed engines 30, 110–114, 372–377 and 1004–1011. One or two of these were at Wolverhampton, some half-a-dozen already mentioned at Hereford worked through to Chester and to Birmingham, but by far the larger number were stationed at Chester. These also had 17 in. by 24 in. cylinders. The greater part of the train services between Chester and Birkenhead, and Chester and Manchester (Exchange) were in the hands of these engines. Six more of them, Nos. 3226–3231, were built at Wolverhampton in 1889, although the class was originally designed as early as 1863. The 1889 engines had fluted coupling rods, and the first of them came out as No. 104, but after running for a week or so was altered to 3226. This engine was the first to have a cast iron chimney without copper top.

In 1892–3 twenty 6 ft. 6 in. coupled engines very similar to the rebuilt 808 class were built at Swindon, but these had 17½ in. by 24 in. cylinders. They were mostly



NO. 444 (SERIES 439–444). RENEWED AT WOLVERHAMPTON, 1885.
Coupled wheels, 6 ft.; cylinders, 17 in. by 24 in.

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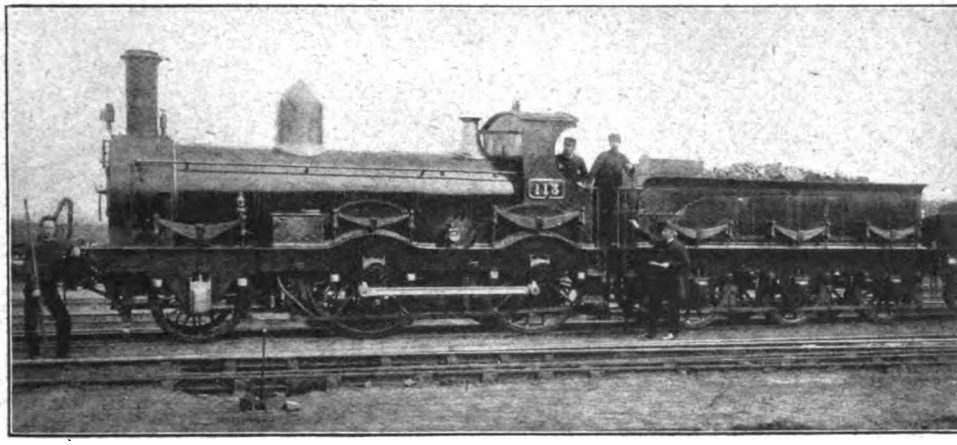
employed between Chester and Wolverhampton, where they took the places of the three "Sir Daniels" after the latter had been converted to goods engines. The 3232 class was also used for the Bristol–Shrewsbury expresses prior to the appearance on the latter of the "Badminton" class.

Any account of the locomotive working on the Great Western Railway during the period with which I am dealing would be incomplete without some mention of the varied assortment of old engines that were stationed at Chester. It always seemed that there must have been some arrangement between the Great Western Railway locomotive department and the local and ecclesiastical authorities of that ancient city, whereby it was stipulated that the architecture of the engines should harmonise with the Roman appearance of that beautiful place. American visitors who spent some time at the cathedral should not have missed the Great Western engine shed. For during the 'eighties and the early part of the 'nineties there was hardly a locomotive shed in the kingdom—always excepting those of the North Eastern at that other cathedral city York—that had collected together a more miscellaneous and assorted lot of old stagers than were to be seen at Chester. Considerations of space and time preclude me from giving any detailed account of them further than to state that some looked as if they had been left by the Roman founders of the city. Included amongst them was an old four-wheeled tank engine of Edward Bury in 1847 with bar frames (engine No. 15), and moreover this had the old original boiler barrel. Any old paleozoic locomotive specimens that the Great Western Railway possessed were promptly sent down to Chester, and a visit to this engine shed on a Sunday afternoon, when they were all at home, was an education in the history of the locomotive engine.

Finally the joint train services between Chester and Birkenhead and Chester and Manchester (Exchange) remain to be mentioned. In some respects they were the "jointest" (if I may coin this expression) services run by any two separate companies. Great Western trains were frequently worked by London and North Western engines, and *vice versâ*. One London and North Western Manchester–Llandudno express was at one time worked from Manchester (Exchange) to Chester by a Great Western engine during 1899–1900. But the joint line from Chester extends only as far as Walton Junction south of Warrington, where the London and North Western Railway main line is reached. From this junction to Manchester the line is entirely the property of the London and North Western Railway.

The Great Western Railway engines used on the joint lines from Chester were principally the 6 ft. double framed 2–4–0 engines 111–113, and the majority of 372–377 and 1004–1011. After 1890 they were joined by the almost identical engines 3226–3231, and of the whole class there were about twenty



*Photo]* [*Loco. Publishing Co., Ltd.*

2–4–0 ENGINE, WOLVERHAMPTON TYPE.
Wheels, 6 ft.; cylinders, 17 in. by 24 in.

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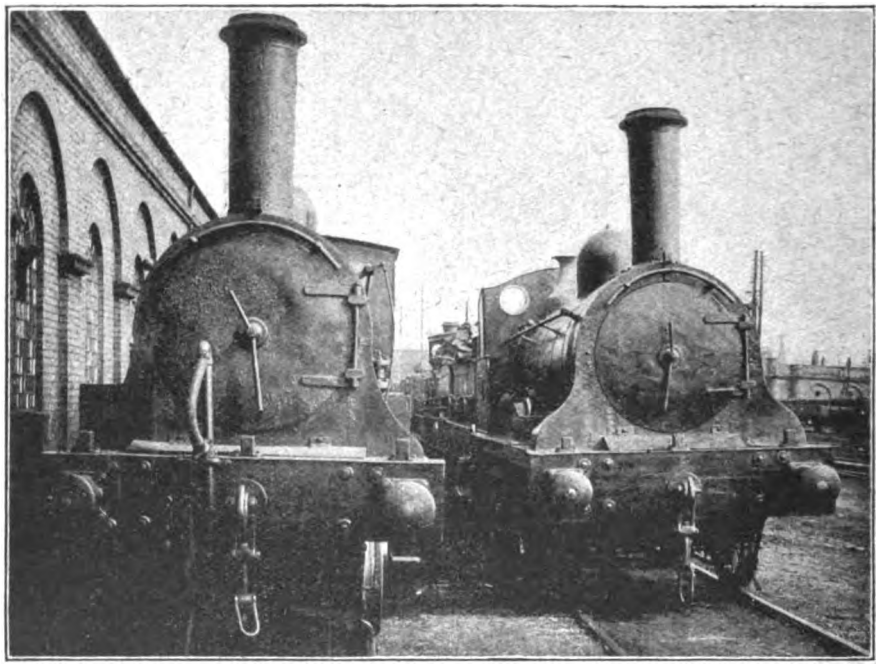
stationed at Chester. The three 7 ft. singles of the "Sir Daniel" class stationed at Birkenhead worked one train daily to Manchester and back. Occasionally one of the 149–156, or "Chancellor" class, worked through to Manchester, and my last footplate trip over the joint line from Manchester to Chester was on one of this class. Most of the Chester nondescripts, 33, 104 and 105 0–4–2 mixed engines, and 106–109 small 2–4–0 passenger



*Photo*] [*Loco. Publishing Co., Ltd.*

OLD ENGINES OUTSIDE CHESTER ENGINE SHED, 1884.

engines with 5 ft. wheels ran principally on the Birkenhead road, but one other specimen from the Chester "museum," No. 894, a 2–4–0 with 5 ft. 6 in. wheels, was a frequent visitor to Manchester. This engine was the only one of its class, and had been built by Messrs. Kitson & Co. in 1868 for the Llanelly Railway and Dock Co. Originally it bore the name *Napoleon III.*, but this had been removed. Two or three Great Western goods engines were stabled in the London and North Western Railway Manchester shed at Ordsall Lane. This shed has since been pulled down, and the Great Western Railway goods engines now find a lodging at Patricroft.

Chester was also the headquarters of a small platoon of 0–4–0 tank engines, all of which had inside cylinders, and all differed from one another. They were employed generally on the colliery branches in the Wrexham district, and two or three are stabled at a small engine shed at Croes Newydd. The Bury bar framed engine No. 15 was one of them, but this engine was broken up in 1904. It was, almost the last Bury bar framed engine at work in this country, and throughout a long life of nearly 58 years was generally quartered in the Chester district, for it was one of the original Shrewsbury and Chester engines.

**(References in recent issues of "The Railway Magazine" to the older locomotives of the Glasgow and South Western Railway have indicated wide interest therein, and have occasioned considerable correspondence. Therefore, before dealing with other English Companies, Mr. Ahrons will, next month, commence a series reviewing the locomotive development of this important Scottish line.)**

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HULL NEW RAILWAY STATION AND HOTEL IN 1850.
(*From an old print.*)

# The York and North Midland Railway.

## [No. IV.]

By H. H. MEIK.

(*Continued from page* 51, *July* RAILWAY MAGAZINE.)

### HULL AND SELBY RAILWAY.

MANY years ago a railway was proposed between Leeds and Hull, but it was not until Sept. 22nd, 1834, that the Leeds and Selby Railway, covering about half the distance of the proposed line, was opened to the public. A line to fill up the remaining section was soon afterwards suggested by the inhabitants of Hull and others, and a Committee being formed, Messrs. Walker and Burgess were instructed to make a survey of the proposed route and to prepare an estimate and plans. Their report having been submitted to the Committee, a public meeting was held in August, 1834, at which the Hull and Selby Railway Company was constituted, and in November of the same year a Bill was lodged in Parliament, which after some opposition in both Houses, received Royal Assent on June 21st, 1836. Under the Act the Company were empowered to raise a capital of £400,000, in 8,000 shares of £50 each and a loan or loans to the extent of £133,333 additional.

The western terminus of the line was at the Selby station of the Leeds and Selby Railway on the south side of the River Ouse. Almost immediately after leaving the station the line crossed the river by "an open balance bridge," or "cast-iron double bascule bridge," for the purpose of admitting vessels and barges up and down the river. This bridge was replaced in 1891 by a swing bridge. There were also two other bridges on the line, one over the River Derwent just before the present station of Wressle, on the Selby side, and the other between Staddlethorpe and Broomfleet, over the Market Weighton Navigation Canal. Both these two bridges were built of cast-iron.

From Selby bridge the line turns, with a curve of about 40 chains radius, to the east and runs in an almost straight line, bearing to the south of east, until it reached Hessle, from which it kept close along the foreshore to the Hull terminus. It passed through a practically level country, the ruling gradient being 1 in 240. Some of the gradients were caused by having to cross the rivers Ouse and Derwent at considerable elevations above the water. The original stations were Cliff, now called Hemingbrough, Eastringham, Staddlethorpe, Brough, Ferriby and Hessle.

At Hull the passenger and goods stations were on the west quay of the Humber Dock, side by side, with a roadway between. The former was stone fronted and consisted of booking office, parcels office and waiting rooms, with the head offices of the Company above. The station itself consisted of 4 lines of rails and 2 platforms, which were roofed over. The goods station was of a



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sufficient size, having lines on each side which ran to the Humber Dock. The passenger station now forms part of the Kingston Street (Central) goods station. This line was opened on July 1st, 1840, amidst great rejoicings. A special train proceeded to Selby, where the guests were entertained to lunch, and afterwards the special returned to Hull accompanied by a Selby contingent, where a civic banquet concluded the festivities of the day.

The Hull and Selby Co. had entered into an agreement with the Leeds and Selby Co. that the conveyance of merchandise by water from Selby should be discontinued as soon as the former Company was in a position to carry that class of traffic. Arrangements had been made, however, by a syndicate for continuing the river traffic, and if necessary for increasing the number of boats. The action of the syndicate in trying to establish a competing route was strongly animadverted upon at a meeting of the Hull and Selby Company, held in August, 1841, as a scheme to force a sale of their railway to the York and North Midland Company, and dissatisfaction was expressed that the Leeds and Selby line had not been secured, when the mutual independence of the two Companies was taken into account, and which would have resulted in a single through route between Leeds and Hull. Ultimately an arrangement was come to whereby the steamboat competition was withdrawn.

There was no stone blocks on the line, two-thirds of the distance being laid with longitudinal bearers and the remainder with cross sleepers, the whole being kyanized. The longitudinal bearers were of Baltic half timbers and were connected by cross sleepers. Rails were web-footed and of somewhat similar form to those used on the Croydon and Newcastle and North Shields Railways. They were of two sizes those for the longitudinal bearers weighing 55 lbs. and those for the cross sleepers 63 lbs. per yard. The locomotives employed at the opening ceremony were named *Exley, Andrew Marvell, Kingston* and *Selby*, all of which were built by Fenton, Murray & Jackson, of Leeds.

The Locomotive Superintendent in 1840 was John Gray, who introduced his patent valve motion into the Hull and Selby locomotives. He also adopted expansive working and inside bearings for the driving wheels, which were 6 ft. in diameter, the other wheels being 3 ft. 6 in. in diameter. The cylinders were 12 in. by 24 in., and the boiler 9 ft. long by 3 ft. 3 in. diameter, with 94 tubes 9 ft. 6 in. long. The weight of the locomotive was 14 tons. These locomotives were built by Shepherd & Todd, of the Railway Foundry, Leeds, where David Joy worked as an apprentice in 1843. Two of the engines were named *Star* and *Vesta*. The Railway Foundry also built a six-coupled locomotive with cast-iron wheels, 5 ft. 6 in. diameter and cylinders 16 in. diameter by 24 in. stroke. The steam pressure was 90 lbs.

Another engine was built in 1840 and fitted with Messrs. Locking & Cook's patent rotary valve. This locomotive worked on the Hull and Bridlington branch and was afterwards numbered 48 on the York and North Midland Railway. There was also 12 six-wheel locomotives, built by Fenton, Murray and Jackson, of Leeds.

In 1840 there were five trains daily each way, the fares being 4s. 6d. first-class, a rate of 1·76d. per mile; 4s. second-class, a rate of 1·56d. per mile; and 2s. 6d. third-class, a rate of ·98d. per mile. In September, 1849, there were 6 trains on week-days from Selby, one of which took 75 min. and the others 80 min. On Sundays there were two trains, both of which took 80 min. From Hull there were the like number of trains on week-days, two of which took 70 min., one 80 min. and the other three 85 min. On Sundays one train took 80 min. and the other 83 min.

The Hull station at the west quay of the Humber Dock having been found very unsuitable, being away from the business centre of the town, the Company obtained an Act dated June 18th, 1846, for (1) a line branching off from the Hull and Selby main line at Hessle Junction, 1 mile 41 chains east of Hessle station and running *viâ* Hessle Road Junction, where it crossed the Bridlington branch to the Paragon station, and (2) a line from West Parade Junction to the Bridlington branch at Cottingham Junction. These branches were opened in June, 1846. On the same date another Act was obtained to make a line from the Anlaby Road Junction and West Parade Junction to the Victoria Dock and Basin, which was then in course of construction, a length of about 3 miles.

This branch was in abeyance in 1849, and was not opened till the Victoria Dock was opened in 1850. On the route the branch crossed the river Hull at Sculcoats by an opening bridge. This bridge was

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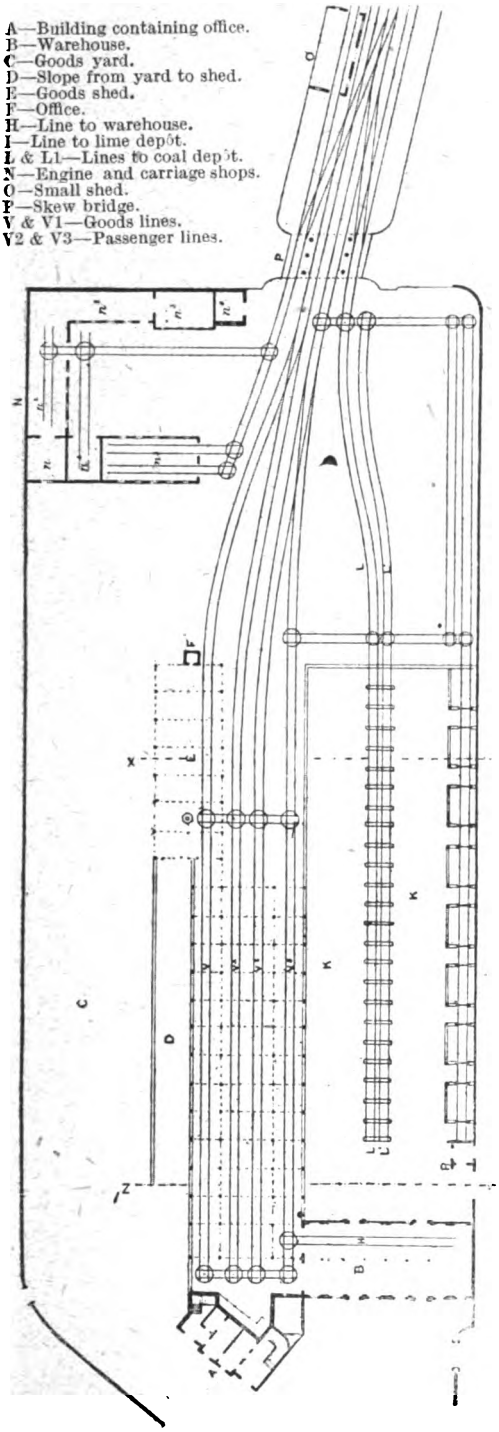
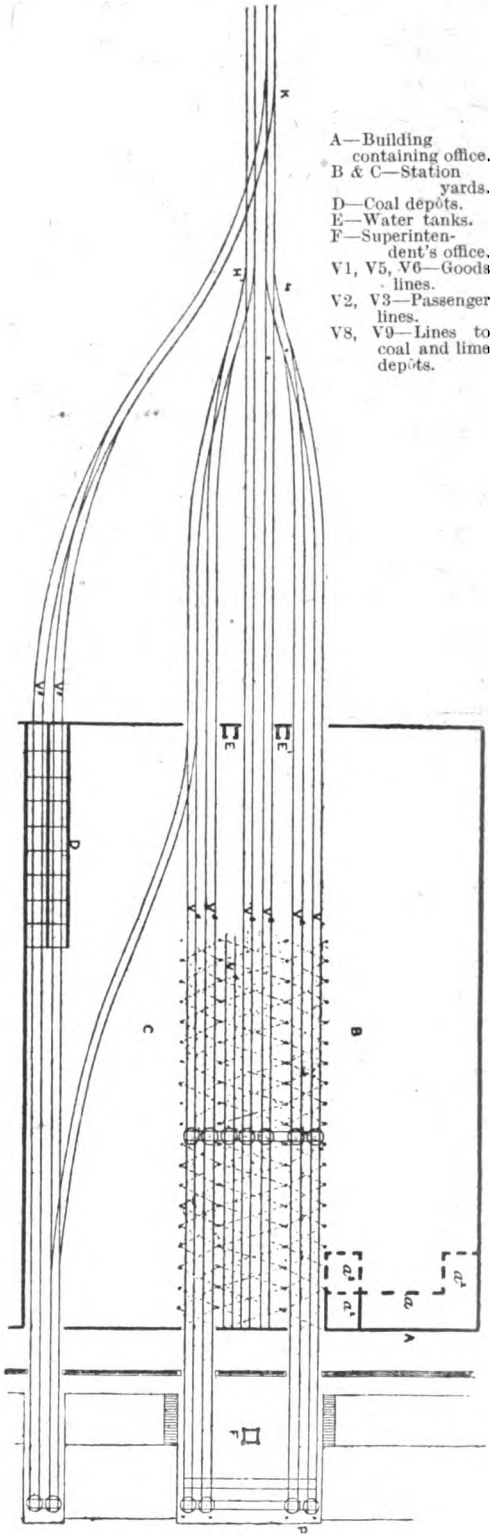
A—Building containing office.
B—Warehouse.
C—Goods yard.
D—Slope from yard to shed.
E—Goods shed.
F—Office.
H—Line to warehouse.
I—Line to lime depôt.
L & L1—Lines to coal depôt.
N—Engine and carriage shops.
O—Small shed.
P—Skew bridge.
V & V1—Goods lines.
V2 & V3—Passenger lines.



PLAN OF THE ORIGINAL STATION AT LEEDS.

A—Building containing office.
B & C—Station yards.
D—Coal depôts.
E—Water tanks.
F—Superintendent's office.
V1, V5, V6—Goods lines.
V2, V3—Passenger lines.
V8, V9—Lines to coal and lime depôts.



PLAN OF THE ORIGINAL STATION AT SELBY.

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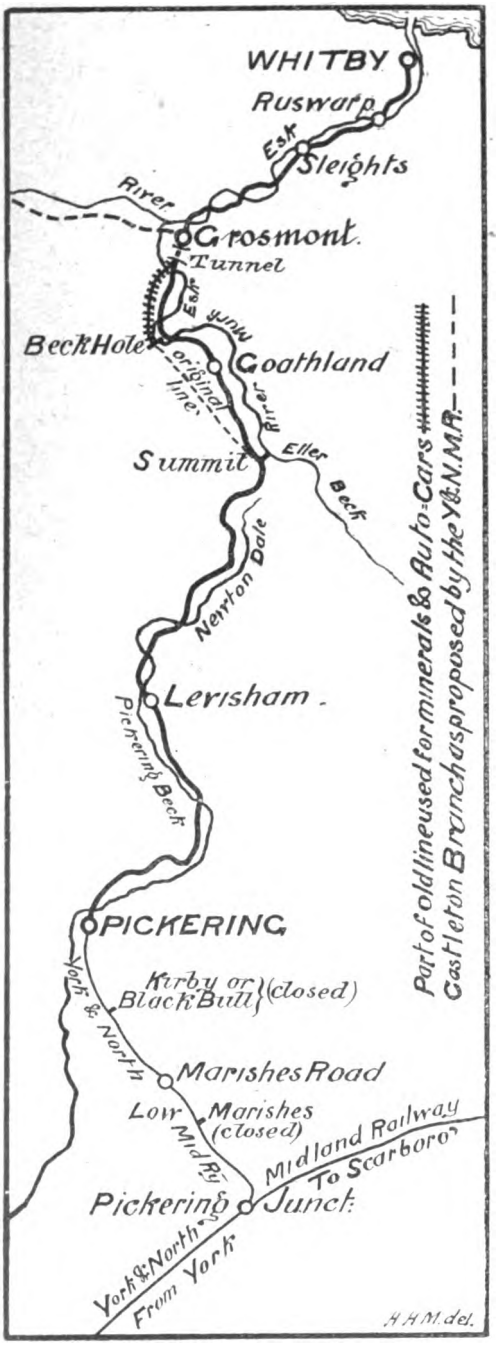


MAP OF WHITBY AND PICKERING RAILWAY SHOWING ORIGINAL AND PRESENT STATIONS, OLD AND NEW SECTIONS OF LINE, TOGETHER WITH RIVERS AND OTHER NATURAL FEATURES.

replaced by the present opening bridge in 1907.

At a meeting of the York and North Midland Company, held on October 20th, 1846, it was arranged that the new station at Paragon Street should, when constructed, be a joint station, one moiety thereof and the line connecting it with the Hull and Selby Railway to be the property of the joint lessees (*i.e.*, the York and North Midland, and Manchester and Leeds Companies),* the other moiety thereof and the line connecting it with the York and North Midland East Riding Line being the property of the York and North Midland Railway Company.

In the Session of 1847 the York and North Midland Company applied for "The York and North Midland (Hull Station) Railway Act, 1847," to which Royal Assent was given on July 22nd of that year. The original Paragon station was opened in 1850 and the present one in 1904.

### Bridlington Branch.

The Hull and Selby Company obtained the Act for the construction of this line on June 30th, 1845. Although nominally a branch, the proposed extension was actually longer than the parent line from which it proceeded. It started from a point 1 mile 52 chains west of the terminus on the West Quay of the Humber Dock, and thence proceeded north-westwards to Cottingham Junction, from whence it continued practically due north to Driffield and then north-eastwards to Bridlington. The original intermediate stations on the line were Cottingham, Beverley, Lockington, Hutton Cranswick, Driffield, Nafferton, Lowthorpe, Burton Agness and Carnaby. Since 1853 another station has been opened, called Arram, situated between Beverley and Lockington. The line was opened in an incomplete state on October 5th, 1846.

In September, 1849, there were four stopping trains each way on week-days and one (the mail) on Sundays. In June, 1853, there were five stopping trains from Hull on week-days and one on Sundays. One week-day train and the Sunday train were first, second and Government, while the others were all first, second and third-class. The quickest train took 90 min. for the

* The interest or connection of the Manchester and Leeds (now Lancashire and Yorkshire) Company, with the Hull and Selby Company, is referred to later on in this article.

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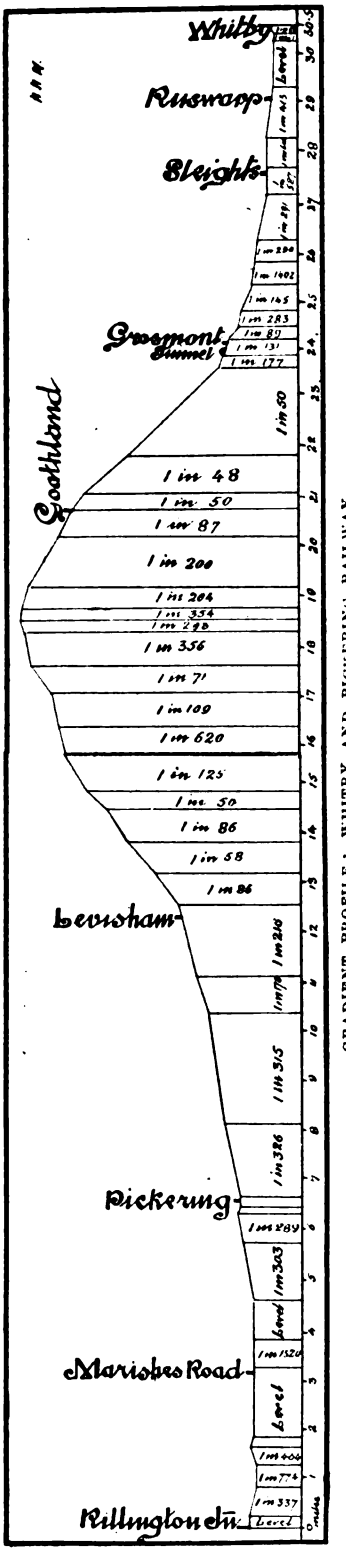
journey. From Bridlington there were also five week-day trains and one on Sundays. Two week-day trains and the Sunday train were first, second and Government, the others being first, second and third-class. The quickest train was timed at 1 hour 20 min. for the journey. All the other trains stopped at every station.

HULL AND SELBY LEASE AND PURCHASE,

At the latter end of December, 1843, an arrangement was entered into between the Hull and Selby and Manchester and Leeds Companies for consolidating into one concern the traffic and business of the two Companies, to commence from December 31st, 1843, the net profits being divided in certain proportions. An application was to be made to Parliament in the ensuing year to procure the necessary powers to give effect to the arrangement. Owing to the lateness of the negotiations the Bill was not allowed to be brought into Parliament. The Standing Orders Committee reported that "the Standing Orders ought not to be dispensed with." Although the Bill was thrown out the two railways continued to be worked under one management. During 1844, in consequence of the Manchester and Leeds Company having entered into some new railway projects, the Hull and Selby Company considered that the original agreement was virtually at an end and resolved at an adjourned special meeting held on March 7th, 1844, that it was "inexpedient to enter into any amalgamation of the two Companies."

At a meeting of the Hull and Selby Company, held on May 20th, 1845, a resolution was passed to offer the line to the York and North Midland Company upon certain terms which had been previously arranged. The lease to commence on July 1st and to be for 1,000 years.

At a special meeting of the York and North Midland Company, held on June 28th, 1845, it was resolved that an agreement should be entered into "for leasing in perpetuity the Hull and Selby Railway with the power of purchasing the same." On the same day a special meeting of the Hull and Selby Railway was held when the proposed agreement received their approval and confirmation. An Indenture or Deed of Contract was accordingly executed on June 30th, 1845, and the line was accordingly handed over to the York and North Midland Company on the following day.

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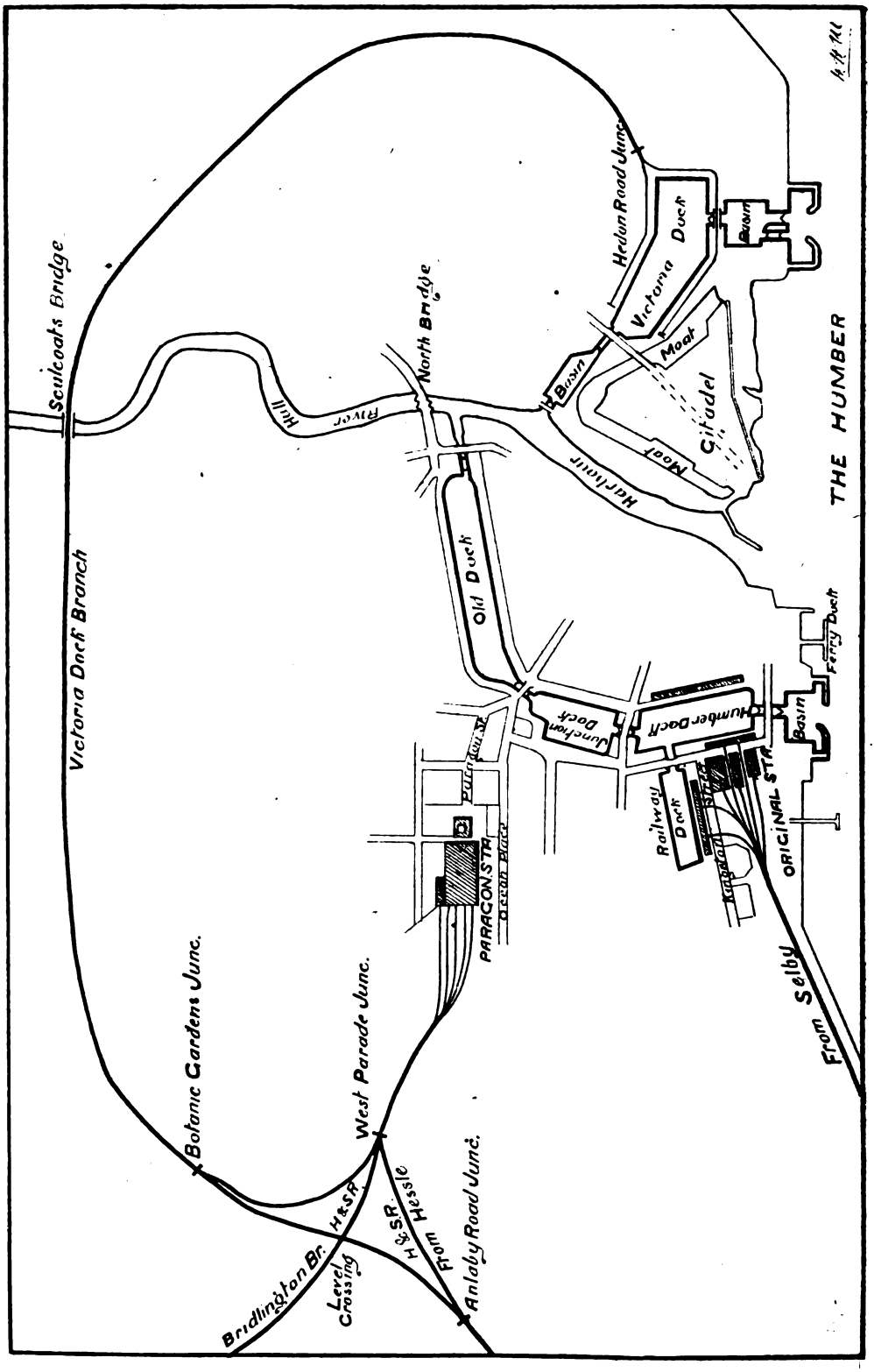


HULL RAILWAYS AND DOCKS IN 1850.

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The Manchester and Leeds Company, having been outbid in the matter of the Hull and Selby line, became auxiliaries during the summer of 1845 in an independent line which was being promoted between Leeds and York, and also active promoters of the "York and Hull Railway," which was to connect with the first scheme near York and proceed *viâ* Pocklington, Market Weighton and Beverley to the Docks at Hull, with branches to Driffield and Hornsea and a further line from Market Weighton to connect with other projected lines at Selby. This latter line would have covered the same ground as the one which was afterwards constructed by the York and North Midland Company.

However, it was eventually arranged between the two Companies (*i.e.*, the York and North Midland and Leeds and Manchester Railways) that they should join together for mutual protection; accordingly, in October, 1845, a Memorandum of Agreement was entered into between the two Companies whereby the Leeds and Manchester Company should be admitted as joint partners in the Hull and Selby Lease and Purchase. This Memorandum was laid before a meeting of the Leeds and Manchester Company, held on December 17th, 1845, a special general meeting of the York and North Midland Company, held May 4th, 1846, and a meeting of the Hull and Selby Company, held on February 28th, 1846, and was confirmed by all three Companies. To legalise the Agreement "The Hull and Selby Railway Purchase Act, 1846, was obtained on July 27th, of that year, *on the joint application of all three Companies.*"

Under the Act all agreements made prior to the date thereof were made binding on the three Companies. The various law suits which arose out of these arrangements were terminated by the North Eastern Railway accepting the whole of the engagements. The purchase of the Hull and Selby Company was completed by the North Eastern Company, on March 1st, 1872.

## LINES ACQUIRED BY THE YORK AND NORTH MIDLAND RAILWAY COMPANY.

### The Whitby and Pickering Railway.

This line was constituted under two Acts of Parliament, the first of which was dated May 6th, 1833, and authorised a capital of £80,000 and a loan of £25,000. The second, dated May 5th, 1837, authorised a further capital of £30,000, making a total of £135,000. The course of the line follows the valley of the Esk from Whitby, westwards to Grosmont the Esk near Whitby being diverted to that end. There were also several bridges, mostly of wood, crossing it in other parts of the valley. At Grosmont the line turns almost due south, and immediately after leaving the station the only tunnel on the line was encountered. It was constructed for one line of rails, and was 130 yds. long, 10 ft. wide, and 14 ft. high. The fronts were of neat and good proportions, built in the castellated style of architecture. Continuing up the Goathland Dale, following the Murk Esk and Eller Beck to the summit cabin, situated about halfway at Fen Bogs, from the summit the line proceeded down Newton Dale, following the Pickering Beck past Lewisham and Newton to Pickering, a distance of 23 miles 79 chains *viâ* the deviation line afterwards referred to. There were altogether about 40 bridges and culverts and four level crossings on the line. The stations are the same now as they were in 1845.

There was an incline varying between 1 in 11 and 1 in 28½ between Beck Hole, 2¼ miles south of Grosmont, and Goathland, which was worked on the principle of the descending load pulling up the ascending load. This method of working has been described in the Railway Magazine in an article entitled "Self-Acting Inclined Planes," by Charles H. Harrison, Chief Engineer, North Eastern Railway (*vide* Vol. III., page 523, December, 1898). This method was afterwards abandoned for a steam winding engine situated at Goathland. The line, which was a single one, with passing loops, was officially opened on May 26th, 1836, and with the exception of the incline was worked by horses.

George Hudson, who was visiting Whitby in 1835, when the line was being made, arranged, after negotiations with the Directors, to purchase the line on behalf of the York and North Midland Railway, and on June 18th, 1846, an Act was procured authorising the sale of the line at the price of £80,000, with power to use locomotive engines.

The line was opened as a double line track for locomotives in 1847. This had necessitated the construction of a new tunnel at Grosmont large enough to contain a double line. It was formed close to the old single tunnel, and was 143 yds. long by 7 yds. high and 8 yds. wide.

In order to avoid the inclined plane, the North Eastern Company, who then owned the line, applied to Parliament for a

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Deviation Act, which received Royal Assent on May 11th, 1861. The deviation practically commenced at the summit cabin and kept to the east of the old line the whole way, following first the course of the Eller Beck for about two-thirds of the way, and then the Murk Esk till it joined the old line a little to the north of the Grosmont Tunnel.

In September, 1849, there were three trains each way on week-days. From Pickering the mail took 85 min. and the other two 90 min. each. From Whitby one train took 90 min., another 80 min., and the mail 85 min. The only Sunday trains were the mails. In June, 1853, there were still only three trains each way on week-days and one on Sundays, those from Pickering each taking 85 min., while those from Whitby took 80 min.

For further information regarding this railway readers are referred to the RAILWAY MAGAZINE, Vol. VII., pages 138–242 (August and September, 1900), and to "A History of the Whitby and Pickering Railway, 1906," both by Mr. G. W. J. Potter, of the Railway Club.

### EAST AND WEST YORKSHIRE JUNCTION RAILWAY.

About the year 1845 an independent Company was formed to promote a line from Poppleton Junction, on the York, Newcastle and Berwick Railway, to Knaresborough, where it was intended to join the Leeds and Thirsk Railway, then under construction, and a Bill was accordingly presented to Parliament, which received Royal Assent on July 16th, 1846. The Company by its Act was authorised to raise capital to the extent of £200,000 in 8,000 shares of £25 each and to borrow £66,000.

The line from Poppleton Junction to Haypark Lane, about a mile east of Knaresborough, was opened on October 30th, 1848, a temporary station being erected. The remaining portion of the line (about a mile) to Knaresborough, including a tunnel under the town, was opened on October 1st, 1851. This section was first worked by the York, Newcastle and Berwick Company, but evidently their terms were too high, as in September, 1849, the Company appealed to them to reduce the working charges, and subsequently the line was worked by Messrs. E. B. Wilson & Co., of Leeds, on behalf of the Company, as an independent concern. The line, as before stated, started from Poppleton Junction, 1 mile 47 chains north of the present York station. The intermediate stations are the same now as they were in June, 1853, viz.:—Poppleton, Hessay, Marston Moor (situated about a mile north of the battlefield of that name), Hammerton, Cattal, Allerton and Goldsborough, the total distance from Poppleton Junction to Knaresborough being 14 miles 78 chains according to the Railway Clearing House Map. Starbeck, formerly called High Harrogate, was 1 mile 49 chains further on.

In 1848 the Leeds and Thirsk Railway obtained an Act for the purchase of the line, but at a meeting held on August 28th, 1848, they passed the following resolution: "That the amalgamation with the East and West Yorkshire Junction Railway be postponed as advised by the Company's solicitor"; and on October, 1848, the East and West Yorkshire Company opened negotiations with the York and North Midland Company, with the ultimate result that at a meeting held on June 30th, 1851, it was resolved to unite the undertaking with the York and North Midland Railway—in the first instance under a working agreement for 99 years, commencing July 1st, 1851—and as soon as an Act could be obtained, to annul the working agreement and merge the undertaking into the York and North Midland Company. Under this arrangement the line was worked by the York and North Midland Company from July 1st, 1851, and the receipts were included in those published by that Company.

In the year 1847 the York and North Midland Railway purchased the following canals:—

(a) *The Pocklington Canal*, running from a point one mile south of Pocklington to the River Derwent Navigation at East Cottingworth.

(b) *The Market Weighton Canal*, incorporated in May, 1772, 5¾ miles long, and running from a point between Houghton and Harswell, *viâ* Whalsea and Newport to Weighton Lock on the River Humber, above Broomfield Island.

(c) *Sir Edward Vavasour's Canal*, sometimes called "Holme Canal." Formed under an Act of 1772. It was about 27 chains long, and was a short cut from the last-named canal.

(d) *The Leven Canal*, running westwards from the village of Leven to the River Hull, near Arram, a distance of three miles.

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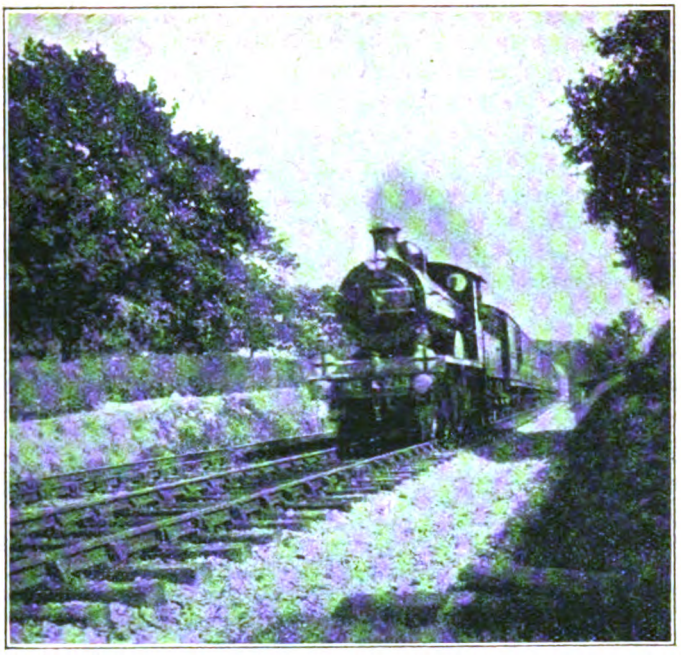
# The "Sunshine" Line.

## TO THE SUNNY SOUTH BY THE PICTURESQUE ROUTE.

By
J. F. GAIRNS.



*Photo*] [*P. Belloc.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

Portsmouth Express near Billingshurst.
Rebuilt 4-4-0 locomotive, No. 213.

NOT many of the "great" railways can claim equal honours with the London, Brighton and South Coast Railway in respect of the scenic beauty of all routes, there being probably less than half-a-dozen miles—exclusive of tunnels!—out of a total of over 430, which cannot be said to provide more or less picturesque features. This applies, indeed, throughout a large proportion of the London suburban area, at any rate after New Cross and Clapham Junction are passed, from London Bridge and Victoria respectively; and for virtually the whole mileage elsewhere a journey by what is sometimes referred to as the "Sunshine" Line is replete with scenic charms of no mean order.

All routes from London towards the coast traverse the "Downs" country, and these great chalk ridges, both North and South, provide that diversity of conformation upon which picturesque scenery is so often built. The country is, moreover, exceptionally fertile, and the wooded slopes, tree-clad hills, picturesque valleys, occasional chalk quarries, and the luxuriant vegetation characteristic of the counties of Surrey and Sussex, combine to supply all the elements which constitute natural beauty in constant variety.

There is not the majestic grandeur of the mountains; nor the special features associated with particular areas such as the Peak and Lake districts, the lochs of Scotland, or the orchards and hopfields which beautify certain other counties. But the rolling downs, which also provide background to other parts, have a beauty of their own; while picturesque farm houses and villages and not a few ancient halls and castles, together with the beauty incidental to English rural scenery at its best, lend interest to almost every journey on this line. Main routes and branches all partake of this character, the suburban lines include it in large measure, and even the numerous tunnels have their share, many of them having exceedingly pretty approaches, and giving majestic views on emerging from their darkness, while the deep cuttings which occur so frequently also have their value, from the artistic point of view as well as in regard to engineering and railway aspects.

As the "Brighton" line, to which description the official title of the London, Brighton and South Coast Railway is often shortened, there may be a tendency to consider the Brighton route as providing the main part of the traffic. It is certainly a very big factor, and from all points of view



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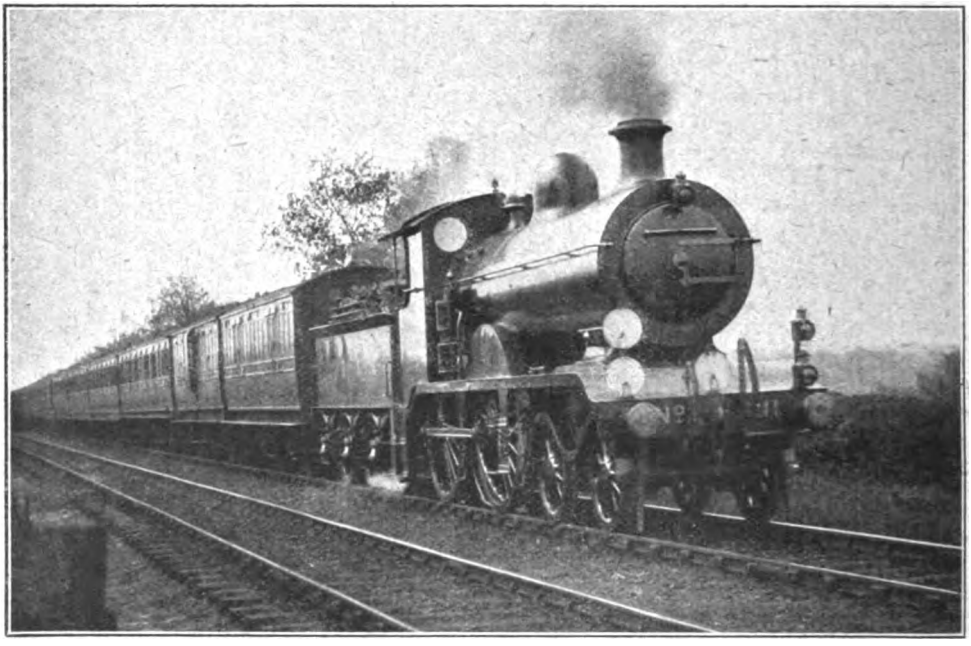
this route is the stem or trunk of the system. But nowadays the Portsmouth and Hastings routes are quite as important, and a large number of the express trains are worked quite independently of Brighton traffic. In early days, it is true, the idea was to work these as eastern and western offshoots of the London–Brighton route, and the first section towards Portsmouth, from Brighton to Shoreham, was opened for traffic (May 12th, 1840) before through communication had been completed between Brighton and the Metropolis (September 21st, 1841).

series of connecting and inter-connecting lines has been constituted within an area which is approximately triangular in shape, served exclusively or almost so by the London, Brighton and South Coast Railway, with only incidental incursions by the South Eastern and Chatham Railway on the one side and by the London and South Western Railway on the other.

Somewhat curiously, both of the extreme destinations are reached over lines which are now either jointly owned or operated under running powers in conjunction with



*Photo]* [*E. S. Hallett.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

Hastings to London Bridge Express near Wivelsfield.
Rebuilt 4-4-0 locomotive. No. 211.

It was not long, however, before these sections obtained more direct routes, the Keymer Junction–Lewes line being made at an early date (October, 1847), to enable trains to run towards Hastings avoiding Brighton. The Three Bridges–Horsham route to Portsmouth followed somewhat later, opened throughout August 3rd, 1863, but it was not until the late 'sixties that the direct lines from London to Horsham *viâ* Sutton and Dorking became available. Meanwhile, however, the Tunbridge Wells routes had been gradually built up, with the result that instead of the original T-shaped system, a

one or other of these two companies, while the "border" lines of the triangle referred to both include sections of joint ownership or involve a degree of interworking with the same two railways. Thus on the east the line through Sanderstead and Upper Warlingham to Oxted is jointly owned with the South Eastern and Chatham Railway, and access from St. Leonard's to Hastings is by running powers; while on the west the Epsom–Leatherhead section and the concluding portion of the Portsmouth line are joint with the London and South Western Railway.

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It is only necessary to examine a map to note the complication of lines which make up the system. There are virtually six divisions of traffic, apart from the London suburban services, though many are more or less inter-connected. Four of these rank as main line services, (1) London to Brighton direct (with the Worthing traffic), (2) London to Eastbourne and Hastings direct, (3) London to Portsmouth direct, and (4) Portsmouth to Hastings *viâ* the coast. The last mentioned indicates a feature which must not be overlooked, for although rather of the nature of a series of connecting links, it was originally the main portion of the system after the direct line from London, and is now characterised by frequent local services on many sections, and is also used in parts by a number of principal express trains.

The fifth division covers the group of lines associated with what may be termed the Tunbridge Wells districts. Most of these were dealt with in the RAILWAY MAGAZINE for August and September, 1914. A feature of many of these services is that *viâ* Lewes and from East Grinstead *viâ* Horsted Keynes to Haywards Heath, they are largely concerned with the facilities provided in the Brighton area. Similarly there are several branch routes associated with the Portsmouth direct line, and a few through trains, including certain expresses, are operated between London and Portsmouth *viâ* Three Bridges and Horsham.

The concluding division covers the branches from Horsham—or more correctly Itchingfield Junction, just beyond where Christ's Hospital and West Horsham station is now situated—to Shoreham, the Midhurst branches from Pulborough and from Chichester, the Littlehampton and Bognor branches, and the Hayling Island Railway (worked by the London, Brighton and South Coast Railway), the offshoot to Cosham, and the Southsea branch (joint with the London and South Western Railway).

A notable feature of the local train services is the manner in which so many routes are correlated to give very full facilities in certain areas, as between Brighton and Lewes or Worthing, and to a lesser degree between Ford Junction and Portsmouth, and on the Eastbourne and Hastings section. There are, indeed, quite a number of traffic centres which possess considerable interest from the train working point of view.

Thus at Three Bridges there are branches on either side of the main line, and at East Grinstead, upper and lower stations, there is a general inter-communication of trains in four directions many times each day. Horsham is another centre, with two routes from the north, and three southwards, one diverging at Christ's Hospital station, where a separate island platform located on a sharp curve is provided, and proceeding to Guildford, a second *viâ* Henfield and Steyning to Shoreham and Brighton, while the main route to Portsmouth also includes through working of some of the Midhurst trains from Horsham instead of from Pulborough. It is interesting to note incidentally that part of the Midhurst branch from Pulborough preceded the connection to Ford Junction (the original Arundel station), the line from Horsham to Petworth having been opened October 15th, 1859, whereas the link from Hardham Junction, where the Midhurst line leaves the main line beyond Pulborough, to Ford Junction was not completed until August 3rd, 1863.

In a following article it is proposed to deal with the development and characteristics of the Portsmouth direct line and its branches, and for the present it will therefore be sufficient to mention the peculiar scenic attractions which this route possesses. Through Leatherhead and Dorking its beauties are well known; but while the North Downs are then left behind and the South Downs do not come into view for some distance, really beautiful country is traversed through Billingshurst and Pulborough, with the River Arun—always a great attraction to anglers—as close companion for many miles, while the majestic sweep round Arundel Castle, with the downs as background, is not easily forgotten.

While dealing with general features of the "Sunshine" Line, it is necessary to note the large number of prosperous and favourite seaside resorts connected up by the Coast line, though from London provided with more or less direct facilities. In the east are Hastings, St. Leonard's and Bexhill, with Eastbourne, Newhaven and Seaford between them and Brighton, the metropolis of this portion of the south coast. Westwards are aristocratic Hove, Shoreham and Lancing with their famous stretches of bungalows, locally referred to as "Bungalow Town," and beautiful Worthing. Passing the lesser known resorts of Goring-on-Sea and Angmering, from Ford Junction or Arundel branch trains run to Littlehampton—"The

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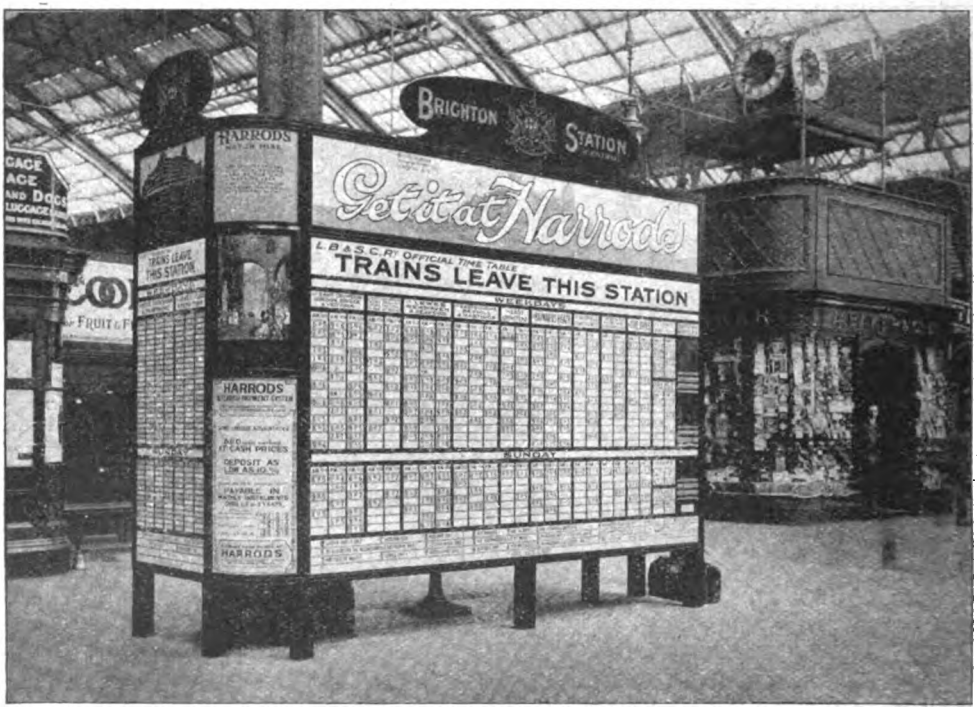
Children's Paradise." Bognor needs no introduction, and from Chichester to Portsmouth access is given to several pretty little old-world places—Bosham, Emsworth, etc. From Havant runs the Hayling Island Railway, worked by the Brighton Company, and from Fratton the Southsea branch, temporarily closed, though there is ample connection from Portsmouth by tramcar.

And although the line terminates at Portsmouth Harbour, the sphere of the London, Brighton and South Coast Railway, of whose trains run on to the Pier, separating at St. John's Road station, the one direct to Sandown, Shanklin and Ventnor, with a branch to Bembridge, and the other to Newport whence diverge the various routes to Cowes, Sandown, Ventnor, and by the Freshwater Railway to Yarmouth and Freshwater.

There is an impression that travel to the Isle of Wight is undesirable under present conditions. This is entirely erroneous, and at no time have the restrictions been more serious than the production, if required, of




LONDON, BRIGHTON AND SOUTH COAST RAILWAY.
New Train Indicator, Brighton Terminus.

and its partner in this district, the London and South Western Railway, does not end here, for the joint steamers running in connection with express trains give access to the "Garden Isle," as the Isle of Wight is sometimes termed. Moreover, even when the island is reached, these railways are still concerned for a short distance, the railway on Ryde Pier and as far as St. John's Road station, Ryde, being the joint property of the two mainland companies, though necessarily worked by the Isle of Wight and Isle of Wight Central Railways, both a National Registration card, and even this does not apply now, a statement of nationality only being called for on boarding or leaving the steamer at Ryde. A very good service of boats across is available, while additional facilities were introduced on July 14th, very nearly reaching the full standard associated with normal summer seasons. The Island companies provide ample train services, and issue the well-known weekly and fortnightly season tickets as under normal conditions. Such other restrictions as may apply—in regard to lighting and the

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prohibition of illuminations, use of cameras, etc.—are virtually the same as those in force at hundreds of seaside resorts elsewhere, and which have not been found in practice to offer any great hindrance to the full enjoyment of a holiday, whether short or long, even in war time.

A peculiar feature of train working on the "Brighton" line is the extent to which main line engines are given triangular duties. Thus several of the turns may be classified as Brighton-London-Portsmouth-Brighton, or London – Brighton – Portsmouth – London, with similar arrangements covering other variations, or treating other routes in the same way. This explains why big engines are sometimes found working suburban trains, particularly those which run from Victoria to London Bridge, or *vice versâ*, *viâ* Selhurst and Norwood Junction. The engines are thus utilised between journeys from Brighton to London Bridge and London Bridge to Brighton, or similar turns.

There are also many branch journeys which are, from the engine point of view, made continuously, as from Tunbridge Wells to East Grinstead, thence to Three Bridges, later to Horsham, and from there to Guildford, to Brighton *viâ* Steyning, or even to Pulborough and on to Midhurst. Each stage forms a separate train, but actually both engines and carriages at times make these and similar long and involved journeys. The Coast line also includes through working right from Hastings or Eastbourne to Portsmouth *viâ* Brighton and Worthing. There are also certain Bognor trains travelling from London *viâ* Haywards Heath and Preston to Hove, Worthing and Barnham Junction, though most of the actual Bognor traffic is worked *viâ* Horsham.

Finally mention may be made of the ingenious train indicators now installed at many stations on the Brighton Railway. Two are illustrated, one, on a large scale, as erected at Brighton Central station, the other at Tunbridge Wells. Framework is constructed to suit the situation, and is

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.
New Train Indicator, Tunbridge Wells Station.

sometimes attached to the wall of the booking office, in other cases on a special stand. Lists of train times under the various headings are built up of enamelled iron tablets fitted into grooves, these possessing the advantage that they can be easily changed as timetables may be altered, without requiring the whole to be dismantled, repainted or other measures undertaken. References as to trains running on certain days, etc., appear in red, their explanations appearing at the base of the frame. The platforms from which trains start are also shown in red. A large number of these indicators are already in use; and in due course virtually every station on the line will have them.

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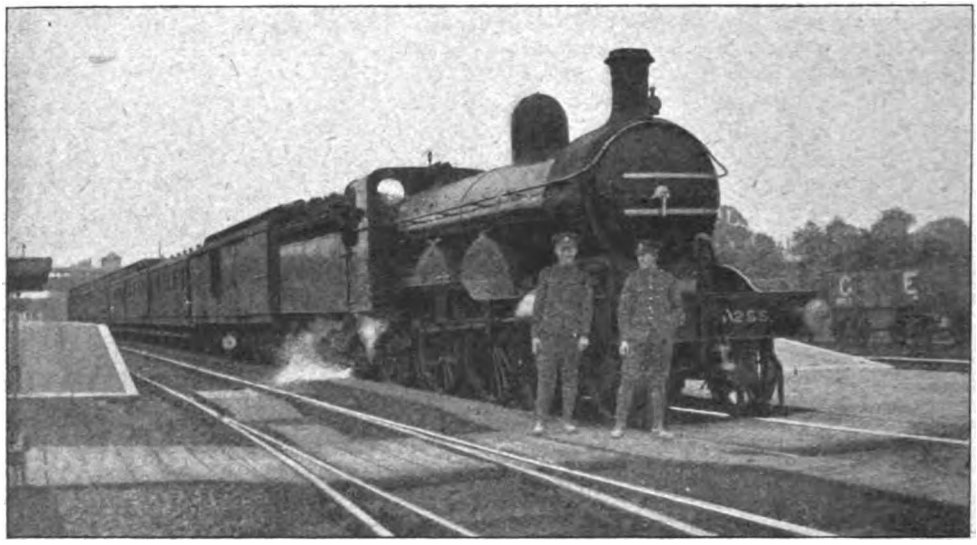

*Photo]* [*K. Albrow.*

GREAT NORTHERN RAILWAY.
Stopping main line train at Biggleswade.
4-4-2 locomotive No. 255.

# British Railway Service and the War. [V.]

PREVIOUS articles under this heading have covered a wide field; but only brief reference to the Cardiff Railway has hitherto been made. The following particulars of what this enterprising corporation is doing in direct war service are, therefore, worthy of notice.

The Marquis of Bute, Chairman of the Cardiff Railway, has joined the Inns of Court Officers' Training Corps, and, we understand, is now undergoing military training in camp at Oxford. Lord Bute is Lord Lieutenant of the County of Bute and Chairman of the County Territorial Association. He is also Honorary Colonel of the 4th Highland Mountain Brigade.

Mr. C. S. Denniss, General Manager of the Company, whose skill as a railway administrator is well known throughout British railwaydom, is a Lieut.-Col. in the Engineer and Railway Staff Corps.

The Bute Docks are under Government and military control during the period of the war, and their management involves considerable strain under unusually difficult conditions. It is calculated that over 3,000 of the Dock workers have enlisted in the various fighting forces.

Commissions are held by several members of the staff and the following may be specifically mentioned.

Capt. J. Dudley Stuart (7th Welsh Cyclists) entered the service of the Cardiff Railway, then the Bute Docks Company, in September, 1894, as an apprentice in the fitting shop. After going through the fitting shop he passed to the drawing office, and was later appointed chief assistant to the Engineer during the construction of the Queen Alexandra Dock. He was appointed Permanent-Way Engineer in July, 1914, and in August, on the outbreak of war, he volunteered for foreign service, but has been retained with his corps on coast defence, and has since been promoted to Captain. He previously took keen interest in the Territorial movement, and for about 5 years prior to the outbreak of war held the rank of Lieutenant in the Territorials.

Lieut. Cyril Tredcroft entered the service of the Cardiff Railway in July, 1906, as assistant in the Goods and Warehouse Department, which position he held until July, 1914, when he was appointed Stores Superintendent. In February, 1915, he received a commission as Lieutenant in



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CAPT. J. DUDLEY STUART.
(Permanent Way Engineer, Cardiff Railway.)

the Army Service Corps, and was sent to the Gallipoli Peninsula. Lieut. Tredcroft served through the South African War in the Army Service Corps.

Lieut. J. H. H. Dare entered the service of the Cardiff Railway about 18 years ago, and has occupied various positions until in 1905 he was appointed Internal Auditor, which position he held until he received a commission in July, 1915, in the 2 5th Batt. Welsh Regt.; he is now stationed at Warrington.

Lieut. Owen Coor Mein entered the service of the Cardiff Railway on August 5th, 1914, as Assistant Permanent-Way Engineer, and took up a commission in the R.E. with the rank of Lieutenant on July 18th, 1915.

A commendable practice has been adopted by the Accountant's staff of the Great Northern Railway in order to inform members who remain at home of matters affecting their comrades who are serving with His Majesty's Forces on land and sea. Duplicated copies of a monthly "News Sheet" are issued, with the inscription "Passed by Censor" as evidence of *bona fides*, and that the interests of the nation are in no way infringed. Names of all men from or concerning whom information is to hand are given alphabetically, and appended to each is an extract from a letter received, or something about the person mentioned. Many little "titbits" are included, and we may congratulate the "Editor" upon the skill he has shown in giving plenty of "substance" in limited space. Here are some examples of "How it is done":—

AUSTING, Pte. W. J. C. (France): "We have now moved nearer the fighting line, and have taken over rather a large place, having two to three hundred patients, so there is plenty to do. Cannell happens to be here for a rest."

BAKER, Petty Officer, H. G. A.: "I am now on a Man-of-War Guard Ship, but only for a short time, and then I hope to rejoin my unit;

LIEUT. CYRIL TREDCROFT.
(Stores Supt., Cardiff Railway).

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from what I hear we are being sent home for service, so I may be in England soon. I think it is time; it is now 15 months since I left, and nearly 21 from the date I was called up. Have nothing startling to report; the usual Navy routine being my daily life now. I am looking forward to seeing you all soon if I am lucky enough to get home. Remembrance to all."

COGGINS, Pte. J. H. (Yorks): "Nearest town Richmond, 3,000 inhabitants; impossible to buy anything except the most common articles. Still under the doctor, and improving."

DUFFIELD, Corpl. A. S. (A.P.C.), Dover: "'News Sheet' is highly appreciated not only by myself but by the other ten boys in my billet who are all railwaymen." Congratulations upon promotion.

DUFFIELD, Trooper D. D.: Joined the Herts Yeomanry, and is getting on well. The Y.M.C.A. Hut in the Camp, at which concerts are given twice weekly, is much appreciated.

EASTOP, Gunner A. V. (Luton): Went into hospital on May 26th, 1916, suffering from pneumonia. We are pleased to say he is, apparently, progressing satisfactorily.

EVANS, Pte. W. J. D. (Salisbury): "All's well. The C. of L. is a good regiment, but very strict in everything."

GREENFIELD, Pte. S. D.: "Am off in a few days to a Casualty Clearing Station in France, quite close to the firing line. I don't mind leaving England in the least; feeling perfectly fit and well. Kind regards to all."

MCMURRAY, Q.M.-Sergt. H. (Egypt): Has been in hospital, cause climatic conditions. We are pleased to say he is now convalescent.

NICHOLS, A.B. S. H. (Germany): Is well, and wrote on April 18th last that he is "still keeping the old flag flying."

There are several sheets of notes of this class, some with more lengthy extracts from letters. Also "Notes on News," giving particulars of men who have called at the offices at King's Cross, men who have left to join the colours, etc.

The following table, recently prepared, may be quoted:—

LIEUT. J. H. H. DARE.
(Internal Auditor, Cardiff Railway).

**With H.M. Forces:**

| | King's Cross Office, including D/A. Staff | Peterboro' Office. | Doncaster Office. | Totals. |
|---|---|---|---|---|
| Officers | 2 | — | — | 2 |
| Rank and File | 61 | 10 | 12 | 83 |
| Do. *ex*-Army Reserve | 6 | — | 1 | 7 |
| Army Pay Corps | 19 | — | — | 19 |
| | | | | —111 |
| Army Reserve | 59 | 8 | 1 | 68 |
| Interned in Holland: | | | | |
| A.B. E. W. H. Mullins | 1 | — | — | 1 |
| Prisoner in Germany: | | | | |
| A.B. S. H. Nichols | 1 | — | — | 1 |
| Demobolised temporarily: | | | | |
| Pte. W. J. Bennett | 1 | — | — | 1 |
| Discharged, Time Expired: | | | | |
| Sergt. E. A. Hartnell | 1 | — | — | 1 |
| Deaths: | | | | |
| L.-Cpl. G. Mackenzie<br>Dvr. H. M. Sweet<br>Pvte. V. F. Seamark<br>Rflmn. H. G. Toll | 4 | — | — | 4 |
| | 155 | 18 | 14 | 187 |

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LIEUT. O. C. MEIN.
(Assistant Permanent Way Engineer, Cardiff Railway.)

A few items of news of interest to the staff, general and military, conclude a production upon which the Great Northern Railway and its staff are to be congratulated.

It is noted also that many members of the staff who are either above military age or have been rejected, are, in conjunction with men from other Chief Offices, doing patrol duty and assisting generally at the Y.M.C.A. Hut outside King's Cross station after 5 o'clock p.m., and colleagues on Active Service reaching King's Cross after office hours are informed that they will be sure of finding a Great Northern man there, and will, if they call, receive a hearty welcome.

A photograph is reproduced of Lieut. (Assistant Paymaster) C. W. Horsley, R.N.R., of the Chief Accountant's Office, Great Northern Railway, King's Cross. He was appointed to H.M.S. *Antrim* in December, 1914, being transferred subsequently to the Mediterranean Naval Staff.

Supplementing references previously made concerning war appointments held by members of the staff of the Great Central Railway, the following list of those holding commissions will be of interest for purposes of record :—

*Directors and Chief Officers.*—The Earl of Kerry, Colonel, Irish Guards; Sir Berkeley Sheffield, Captain, West Riding Regiment; G. P. Dewhurst, Captain (no information); Sir Sam Fay, Lt.-Colonel, Engineer and Railway Staff Corps; J. B. Ball, Major, Engineer and Railway Staff Corps; W. Clow, Major, Engineer and Railway Staff Corps.

*General Manager's Office.*—H. S. Owen, 2nd Lieutenant, Sussex Regt.; W. G. Hopkins, Lieutenant, R.A.M.C.; D. R. Lamb, Lieutenant, A.O. Corps; J. E. Pinion, Lieutenant, Railway Transport; C. G. Dandridge, Lieutenant, Royal Engineers, Railway Corps; S. E. Fay, Lieutenant, Royal Engineers, Railway Corps; W. H. Pryce, Lieutenant, Royal Engineers, Railway Corps; E. Rostern, Lieutenant, Royal Engineers, Railway Corps; H. R. Statham, Lieutenant.

*Solicitor's Dept.*—E. C. Bates, Captain, 1st Herts Regt.; G. A. Powell, Lieutenant, King's Royal Rifles (killed in action).

*Engineer's Dept.*—A. E. Brounger, Lieutenant, Royal Engineers; R. D. T. Jones, 2nd Lieutenant, Royal Engineers; G. M. Gahagan, 2nd Lieutenant, Royal Engineers; G. A. Gibson, 2nd Lieutenant, Royal Engineers; S. J. Higgs, 2nd Lieutenant, Royal Engineers; C. H. E. Bridgen,

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2nd Lieutenant, Kent (Fortress) R.E.; E. A. Walters, 2nd Lieutenant, Kent (Fortress) R.E.; T. G. R. Eagan, Lieutenant, 3rd Lincs. Btn., North Midland Brigade, R.F.A.; E. M. Atkins, 2nd Lieutenant, 104th Field Co., R.E.; G. T. Baxter, 2nd Lieutenant, 21st Btn. Welsh Regt.; J. E. Charnley, 2nd Lieutenant, 3/1st Glamorgan Field Co., R.E.; E. Gardner, 2nd Lieutenant, 2nd Division, West Riding, R.E.; R. Jackson, 2nd Lieutenant, R.F.A.; W. H. Mozley, 2nd Lieutenant, 3/9th Middlesex Regt.; P. Pell-Ilderton, 2nd Lieutenant, 7th Btn. Manchester Regiment; S. C. Saward, 2nd Lieutenant, 1st London Field Co. R.E.; R. Humby, Captain, Royal Naval Division of Engineer Unit; H. F. Marris, Lieutenant, Royal Engineers; D. M. Rowland, 2nd Lieutenant, Royal Engineers.

*Chief Mechanical Engineer's Dept.*—G. S. Lynde, Captain, 18th Service Btn. Manchester Regt.; E. Myatt, Lieutenant, 8th Service Btn. Manchester Regt.; A. J. Sayer, 2nd Lieutenant, 3/11th London Regt.

*Chief Goods Manager's Dept.*—W. B. Bankes, Captain, 3/1st Lancashire R.G.A.; G. Cullis, 1st Lieutenant, Royal Engineers, Railway Transport; G. Leedham, Lieutenant, Royal Engineers, Railway Corps; Chas. Travis, 1st Lieutenant, A.O.C.; D. G. Bourn, 2nd Lieutenant, East Yorks Regt.; J. H. Morton, 2nd Lieutenant, 8th Yorks Regt.; A. Kennedy, 2nd Lieutenant, 7/8th Middlesex Regt.

*Superintendent's Dept.* — A. Blanden, Captain, School of Musketry; R. Stubbings, Captain and Deputy Provost Marshal, 1/7th Essex Territorials; F. J. Dorrington, Lieutenant, A.O.C.; L. Napier, Lieutenant, Royal Engineers; G. Davey, 2nd Lieutenant, Gordon Highlanders; P. W. Dexter, 2nd Lieutenant, Durham Light Infantry; W. J. Malerbi, 2nd Lieutenant, 3/5th Hants.

*Chief Accountant's Dept.*—W. H. C. Binns, 2nd Lieutenant, 12th Btn. East Surrey Regt.; T. T. Binns, 2nd Lieutenant, 13th Btn. Worcester Regiment; B. R. Broome, 2nd Lieutenant, Cheshire Regt.

*Audit Accountant's Dept.*—H. Hulme, 2nd Lieutenant, 2a Reserve Brigade Royal Field Artillery; F. A. Pickles, 2nd Lieutenant, 27th Reserve Battalion Manchester Regt.; L. Thomson, 2nd Lieutenant, 3/22nd London Regt.

*Portmaster's Dept.*—J. H. Smith, Lieutenant, Army Service Corps; G. W. Croft, 2nd Lieutenant, 8th Lincs.; S. H. Moore, 2nd Lieutenant, 11th Lincs.; H. B. Boothby, Lieutenant, R.N.R.; A. F. H. Chafer, Lieutenant R.N.R.; C. V. Crossley, Lieutenant, R.N.R.; A. Dickinson, Lieutenant, R.N.R.; W. E. Senior, Lieutenant, R.N.R.; G. Unsworth, Lieutenant, R.N.R.; W. G. Wood, Lieutenant, R.N.R.; D. M. Gracie, Asst. Paymaster, R.N.R.; W. R. Nocton, Asst. Paymaster, R.N.R.

ASST. PAYMASTER C. W. HORSLEY, R.N.R.
(Audit Accountant's Staff, G.N.R.)

*Stores Superintendent's Dept.*—R. N. Holland, Lieutenant, A.O.C.; A. Washington, 2nd Lieutenant, Royal Engineers (Kent Fortress).

*Dean & Dawson.*—L. R. Christie, Captain, Royal Engineers, Railway Corps.

At the request of the War Office, a second Great Western Railway Constructional Company, to be known as the 275th Company, Royal Engineers Railway Troops, has recently been raised. It consists of 200 platelayers, 18 carpenters, 12 blacksmiths, 2 fitters, 2 engine drivers, 2 firemen, 1 clerk, 1 draughtsman, and 2 cooks, making a total of 240 men. The first draft of recruits proceeded to camp on June 1st, and the

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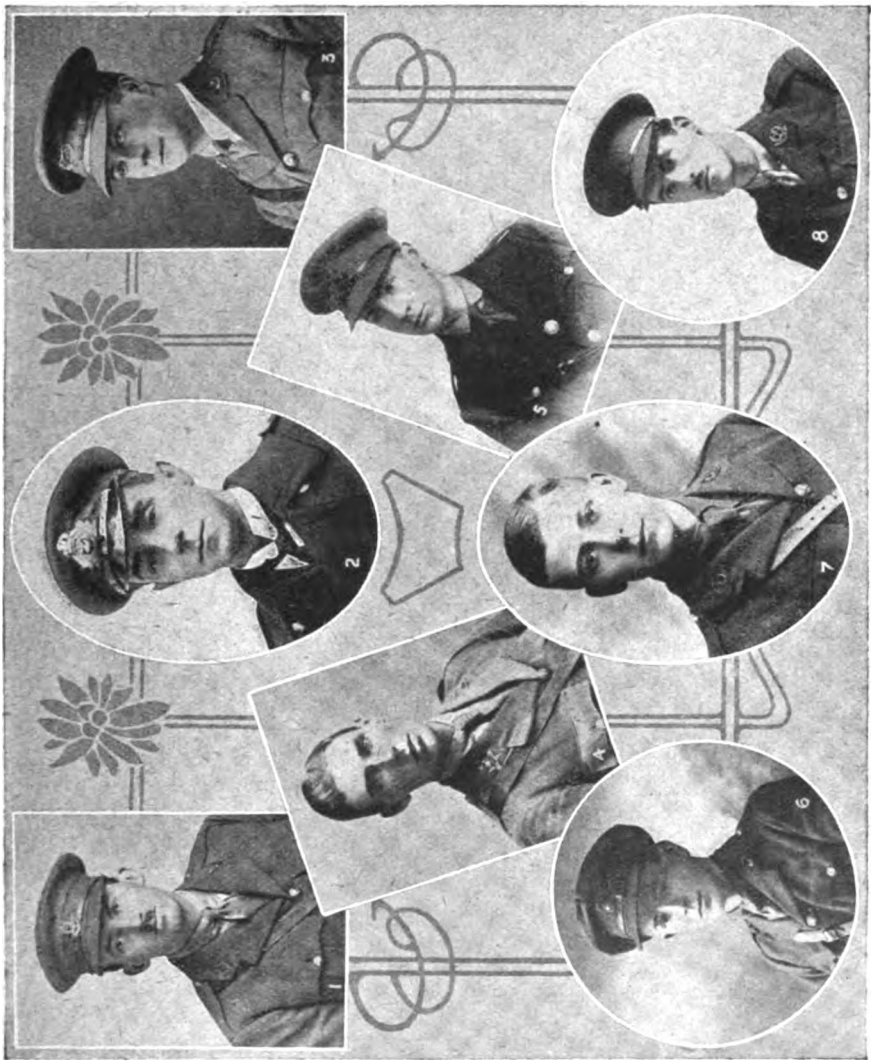
remainder followed in batches of about fifty men at intervals of three or four days. The Company is now complete and in training for service overseas.

Among the recipients of the Distinguished Conduct Medal announced in the King's Birthday Honours list, is Regt. Sergt.-Major A. Keith Scott, of the 7th Cameron Highlanders, formerly of the Chief Accountant's Office, Great Western Railway, Paddington, and the youngest son of Mr. J. T. Scott, Permanent Way Inspector, Maidenhead. He joined the Cameron Highlanders 15th Division at Inverness, as a private. He was appointed sergeant in November, 1914, left for France with his regiment in July, 1915, was promoted company sergeant-major at Loos, September 25th–26th, and regimental sergeant-major in December last. He is said to be the youngest officer of that rank in the British Army. Two of his brothers are serving with the Colours, namely, D. J. Scott, of the Chief Goods Manager's Office, with the 2nd Battalion London Scottish, and G. G. Scott, of the Divisional Engineer's Office, Gloucester, with the recently formed 275th Company of the Royal Engineers Railway Troops. A fourth brother, who was at Somerset House and a sergeant in the Civil Service Rifles, died at Nœux-les-Mines Hospital on January 16th, 1916, from wounds received the previous day, after continuous



A GROUP OF GREAT WESTERN RAILWAY COMMISSIONED OFFICERS.

1.—2ND LIEUT. G. H. ROBERTS, 14th Batt. Worcestershire Regt. (Goods Department, Cardiff).
2.—ENGINEER SUB-LIEUT. W. W. PETERS, R.N.R. (Locomotive and Carriage Department, Swindon).
3.—2ND LIEUT. F. P. C. CAMBRIDGE, Berks Yeomanry (Divisional Superintendent's Office, Paddington).
4.—2ND LIEUT. F. H. JONES, 4th Wilts Regt. (Locomotive and Carriage Department, Swindon).
5.—2ND LIEUT. H. G. FORTUNE, 3/6th Batt. Welsh Regt. (Traffic Department, Swansea).
6.—2ND LIEUT. S. C. KERRIDGE, Northumberland Fusiliers (Goods Department, Weymouth).
7.—CAPT. F. B. MASON, 26th Middlesex Regt. (Chief Goods Manager's Office).
8.—2ND LIEUT. H. GOOD, 15th Middlesex Regt. (Traffic Department, Maidenhead).

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service with his regiment from the first day of war.

Private G. Brown, formerly employed in the Hotels and Refreshment Rooms Department, Great Western Railway, has been awarded the Military Medal. He earned the medal through showing great coolness and resource in a gas attack. After it was over he promptly administered salt and water to his comrades, who would otherwise have been in a critical condition.

The Hon. Lt.-Col. F. B. Mildmay, a Director of the Great Western Railway, has been mentioned in recent despatches. Members of the staff also mentioned are Capt. H. T. Rendell, of the Motor Car Department, Slough, and Regl. Quartermaster-Sergeant E. W. Jackson, of the Audit Office, Paddington.

We are indebted to our Great Western Railway contemporary for group of photographs reproduced showing some of the commissioned officers provided by the Great Western Railway.

Capt. A. H. Tatlow, of the Royal Warwicks, previously reported missing, was killed in action near Arras, on June 4th, and his body had since been recovered. Capt. Tatlow was in civil life an inspector in the Midland Railway Hotels Department. He was in his thirty-first year. The family of the late Capt. Tatlow, Derby, have received the following: "Buckingham Palace—The King and Queen deeply regret the loss you and the Army have sustained by the death of Capt. A. H. Tatlow in the service of his country. Their Majesties truly sympathise with you in your sorrow.—Keeper of the Privy Purse." A similar telegram has been received from the Army Council.

Dr. F. K. Marriott, medical officer to the 182nd Brigade, R.F.A., has been given the ribbon of the Military Cross by General Cavanagh. He is the third son of Mr. W. Marriott, Locomotive and Way and Works Engineer, Midland and Great Northern Railways Joint Committee, Melton Constable. Mr. Marriott's second son, Lieut. R. E. Marriott, B.Sc., R.E., of the Indian Public Works, and formerly at Derby with Mr. Fowler, is now in East Africa with the Railway Sappers. His eldest son, Dr. Marriott, is medical officer to the West Surreys, at present in the trenches.

Included in a list of officers mentioned in General Sir Douglas Haig's despatch for gallant and distinguished conduct in the field, is the name of Temp. Lieut.-Col. C. W. Paget, Royal Engineers. Mr. Paget, who in normal times is the General Superintendent of the Midland Railway, was also mentioned in despatches (Sir John French) in January last, and was the recipient of the D.S.O. on the occasion of the King's birthday.

Mr. H. F. Burt, who was formerly attached to the Solicitor's Office, Waterloo station, London and South Western Railway, is now serving with the Royal Field Artillery, and has been promoted to captain. Capt. Burt has recently been mentioned by Sir Douglas Haig in despatches for "conspicuous and gallant conduct in the field." Mr. H. L. Snedley, also from the Solicitor's Office, is serving with the Trench-Mortar Brigade, and has been awarded the Military Medal for conspicuous bravery.

Another member of the staff of the Cheshire Lines Committee to gain distinction is Sergt.-Major Walter Birtwisle, of the Cheshire Regiment, who was recently mentioned in despatches. He has two other brothers serving in the Army, Sergt. Fred. Birtwisle, of the Royal Field Artillery, and Corpl. T. Birtwisle, of the Royal Engineers. Sergt.-Major Birtwisle at the outbreak of hostilities was in the employ of the Cheshire Lines Committee at Northwich station.

Lieut. E. S. Thompson, of the staff of the Passenger Manager, North Eastern Railway, York, who was granted a commission in March, and after a special course of military training in England was ordered overseas, has obtained promotion, and has been appointed railway transport officer to a post at an advanced base.

Interesting particulars of the Soldiers' and Sailors' Free Buffet at Paddington station are given by our Great Western contemporary, to whom we are also indebted for the attractive series of photographs reproduced on the next page.

It is more than a year since the inviting sign, "Soldiers and Sailors Welcome," was erected outside the buffet at Paddington station. The buffet, which is under military supervision, is in the charge of a superintendent, Mrs. J. J. Runge. The staff consists of a caterer, a secretary, a treasurer, and about a hundred "workers"—all ladies. Each person does duty for an arranged period of time—one, two, or more "shifts" per week, altogether making up four "shifts" to cover every twenty-four hours. The women wear official badges and becoming uniforms of dark blue overalls and black hats.

The work is purely gratuitous and the buffet is entirely supported by voluntary

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donations and subscriptions, aided by a monthly collection from the public at Paddington station, and a couple of boxes in the buffet itself, where the refreshed soldiers and sailors drop in small tokens of their gratitude. The expenses amount to between £30 and £40 per week.

Fifteen hundred men, on an average, partake of refreshments at the buffet during each twenty-four hours. At times the premises are crowded to overflowing, and always are "Tommies" or "Jacks" to be seen at the counter or the tables. In addition, a trolley is used for taking food to men in the trains. It is not unusual for requests to be received from the military authorities for meals to be provided at night to certain men. In these cases something more substantial than "light" refreshments is supplied.

Now and again the superintendent receives gifts of cake, eggs, hampers of fruit, and garden produce, which enable the staff to make up specially agreeable and sustaining refreshments for men who have to undertake night journeys or who are exceptionally fatigued. Such gifts, we may say, are always most acceptable.

Funds are urgently needed to carry on the work, which has been in progress since February 4th, 1915, at the original Free Buffet at Euston station for soldiers and sailors. Thousands

1.—Exterior of Buffet.

2, 3, 6.—Views of the Interior.

4.—The Kitchen. 5.—The Superintendent, Mrs. J. J. Runge.

SOLDIERS' AND SAILORS' FREE BUFFET, PADDINGTON STATION.

*Photos by*] [*A. L. P. Reavil.*

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of men are served each week with hot tea, coffee, cocoa, bovril, sandwiches and cake. During January, 1916, the total number of men served was 34,717, which included a large number of men on leave or sick furlough, who were grateful for the rest and refreshment. Thousands of soldiers and sailors travelling to the North of England and to Scotland and Ireland make use of the buffet. A writing table is provided and in constant use. Cigarettes, socks, comforts, and mittens are distributed freely. Donations will be gratefully received and acknowledged by the treasurer, Mrs. Hugh Ponsonby, and the Viscountess Churchill, 44, Grosvenor Gardens, S.W.

Speaking at Chart Sutton, Kent, Lady Limerick said how grateful she was when the South Eastern and Chatham Railway placed a portion of London Bridge station at her disposal. They had served there up to 63,000 soldiers and sailors a month. She hoped subscribers would feel well repaid when they thought of the good they were doing. Men turned up who were travelling to the most distant parts of the country, and all the food they had for the journey was what they received at the buffet.

The Hon. A. H. Holland Hibbert, a Director of the London and North Western Railway Company, has offered to give any London and North Western man who has had the misfortune to lose an arm, a safety razor. It is frequently in such details that thoughtfulness is shown, even more than in ways which attract greater attention.

Dog collectors have earned special celebrity, and the following particulars of the record of "Bruce," of Swansea, in aid of various war funds, will be of interest. "Bruce" is a most intelligent and sagacious animal, and during the year 1915 was very busy, and collected no less than £85 9s. 4½d., which amount has been distributed to the benefit of the following funds, etc.:—Belgian Relief Fund; Swansea Hospital; Railway Servants' Orphanage; Polish Victims' Relief; Blue Cross Fund (Dumb Friends' League); Y.M.C.A.; Comforts for 3rd Welsh Field Ambulance; Christmas Gift Fund (*Daily Chronicle*); the Cavell Memorial Fund; Red Cross Societies; *Daily Post* War Prisoners' Fund; Tobacco sent to Troops; N.U.R. Orphan Fund. The money was principally collected at the Midland and Rhondda and Swansea Bay stations. "Bruce" is now a frequent visitor at the London and North Western Victoria station, and it is hoped his efforts during the current year will be even better than in the past. The animal is the property of Mr. Morton, Midland Railway. Photographs can be obtained from the owner at 2d. each, which money goes to the benefit of the Fund. "Bruce's" upkeep for the year appears in the balance sheet as £4 6s. 3½d.

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# PERTINENT PARAGRAPHS

## The Railway Benevolent Institution.

THE customary function of an annual dinner, with its toasts, speeches and announcement of the year's donations and subscriptions was abandoned this year, as was fitting, but the interest that always surrounds it was manifest at the fifty-eighth annual meeting of the members of the Institution—which was held in the Great Western Railway General Meeting Room, at Paddington station, on June 27th. The Rt. Hon. Lord Joicey (President of the Institution for the year and Deputy-Chairman of the North Eastern Railway Company) occupied the chair, and was supported by the Rt. Hon. Viscount Churchill, G.C.V.O. (Chairman, Great Western Railway), Mr. Frank Potter (Chairman of Board of Management and General Manager, Great Western Railway), Messrs. C. Aldington (Great Western Railway), A. E. Bolter (Great Western Railway), J. Dunster (Great Western Railway), P. Glover (Great Western Railway), C. F. Grasemann (London and North Western), F. T. Kinsman (late London and North Western), W. Moffatt (late Great North of Scotland), J. J. Petrie (Midland and Great Northern Joint), W. F. Pollott (late London, Brighton and South Coast), C. A. Roberts (Great Western Railway), R. H. Selbie (General Manager, Metropolitan Railway), J. Smither (late North London), C. W. Yates (Great Western Railway), and A. E. Mills, M.A. (Secretary of the Institution).

## Lord Joicey's Remarks.

THE Chairman explained that it had been the custom for many years to have an annual banquet, at which large subscriptions were taken, realising a very substantial sum for the benefit of the Institution; but at the present time, when their whole thoughts were centred upon the war, they were not in a mood for feasting, and it was thought to be better to hold just a business meeting—a course which all would doubtless consider wise. He pointed out that no fewer than 138,000 railwaymen are subscribers. The Institution was formed in 1859, when the first subscriptions produced £2,230. Last year the contributions were no less than £82,000. Year by year the amount had grown, and the twelve months just closed were the third best year in the history of the Institution. But the demands upon the funds continually increase, and it is absolutely necessary that the money to meet them shall increase also.

## Mr. Frank Potter's Report.

MR. FRANK POTTER, General Manager, Great Western Railway, and Chairman of the Board of Management of the Institution, stated that the income for the year was £80,361, which was less by several thousands of pounds than for 1915; but it had to be borne in mind that they were dealing with figures which related to the first complete year of the Institution's operations during the war. One thousand and ten permanent annuities have been granted to officers and servants, and 1,920 permanent annuities to widows; 2,293 children have been and are being maintained and educated at the Derby Orphanage and private schools. During the past year £24,770 was dispensed in temporary assistance; 1,207 existing permanent annuities were paid, representing an annual charge of £20,148; 1,468 existing "contingent" annuities were renewed at an annual charge of £23,821; and 328 children were being educated and maintained, and 51 more were to be admitted this year, at a total cost of £9,000. There are 678 outstanding claims from officers' widows, 570 from servants' widows, and 112 from servant members.

## The Subscription List.

MR. A. E. MILLS, M.A. (the Secretary), then read a list of collections, amounting to £16,231.

| | |
|---|---|
| President (including annual subscription of £100 from His Majesty the King) | £4,622 |
| North Eastern Railway (Sir A. Kaye Butterworth) | 751 |
| Great Western Railway (Mr. Frank Potter) | 3,914 |
| London and North Western Railway (Mr. Guy Calthrop) | 2,119 |
| Midland Railway (Sir Guy Granet) | 1,125 |
| Great Northern Railway (Mr. C. H. Dent) | 987 |
| Lancashire and Yorkshire Railway (Mr. J. A. F. Aspinall) | 779 |
| Cheshire Lines Committee (Mr. J. E. Charnley) | 352 |
| South Eastern and Chatham Railway (Sir Francis H. Dent) | 333 |
| Great Central Railway (Sir Sam Fay) | 322 |
| Furness Railway (Mr. A. Aslett) | 170 |
| Midland and Great Northern Railway (Mr. J. J. Petrie) | 126 |
| Metropolitan Carriage, Wagon and Finance Co., Ltd. (Mr. F. Dudley Docker, C.B.) | 117 |
| Taff Vale Railway (Mr. A. Beasley) | 72 |
| North Staffordshire Railway (Mr. W. D. Phillipps) | 64 |



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| | |
|---|---|
| London, Brighton and South Coast Railway (Sir Wm. Forbes) .. .. .. | 55 |
| Cardiff Railway (Mr. C. S. Denniss) .. | 55 |
| Other collections .. .. .. .. | 268 |

Viscount Churchill Chairman of the Great Western Railway, proposed a vote of thanks to Lord Joicey, President. Other speakers included Mr. F. G. Evans, Mr. F. Dudley and Mr. C. E. Huddlestone.

### New Appointments.

MR. A. E. BOLTER, Secretary, Great Western Railway, proposed, Mr. R. H. Selbie, General Manager, Metropolitan Railway, seconded, and it was agreed, that the Rt. Hon. Lord Wolverton be re-elected treasurer of the Institution. Mr. J. R. Townsend proposed, Mr. A. Plant seconded, and it was resolved, that Mr. F. T. Dale, late Accountant, Lancashire and Yorkshire Railway; Mr. C. A. de Pury, Accountant, London, Brighton and South Coast Railway; Mr. A. E. Doldan, Accountant, Great Eastern Railway; Mr. G. J. Whitelaw, Chief Accountant, Great Western Railway, and Mr. W. W. Woodman, Accountant, South Eastern and Chatham Railway, be re-elected auditors for the ensuing year.

Mr. C. F. Grasemann, London and North Western Railway, proposed, Mr. J. Maguire seconded, and it was carried unanimously, that Mr. J. J. Petrie, Traffic Manager, Midland and Great Northern Joint, and Mr. R. H. Selbie, General Manager, Metropolitan Railway, be elected members of the Board of Management.

### Railway Accidents in 1915.

THE number of persons killed and injured on railways in the United Kingdom in the course of public traffic, during the year ending December 31st, 1915, as reported to the Board of Trade, was as follows:—

| | 1915. Killed. | Injured. |
|---|---|---|
| Passengers: | | |
| From accidents to trains, rolling stock, permanent way, etc. .. | 269 | 1,432 |
| By accidents from other causes | 162 | 2,355 |
| Servants of railways or contractors*: | | |
| From accidents to trains, rolling stock, permanent way, etc. .. | 9 | 183 |
| By accidents from other causes | 403 | 4,962 |
| Other persons: | | |
| From accidents to trains, etc... | — | 2 |
| Persons passing over railways at level crossings .. .. | 69 | 21 |
| Trespassers (including suicides) | 364 | 117 |
| Persons on business at stations, etc., and other persons not coming in above classifications | 88 | 196 |
| Total .. .. .. | 1,364 | 9,268 |

In addition, the railways reported to the Board of Trade in pursuance of the 6th Section of the Regulation of Railways Act, 1871, the following accidents which occurred during the year ending December 31st, 1915, upon their premises, but in which the movement of vehicles used exclusively upon railways was not concerned:—

| | 1915. Killed. | Injured. |
|---|---|---|
| Passengers .. .. .. .. | 6 | 708 |
| Servants of companies or contractors† .. .. .. .. | 59 | 21,202 |
| Other persons .. .. .. | 40 | 562 |
| Total .. .. .. | 105 | 22,472 |

In the table below are shown the accidents that were reported by dock companies and harbour authorities as having occurred to their servants on railway lines belonging to them. These are not included in the figures given above:—

| | 1915. Killed. | Injured. |
|---|---|---|
| By accidents in which the movement of railway vehicles was concerned .. .. .. | 3 | 25 |
| By other accidents .. .. | 1 | 59 |
| Total .. .. .. | 4 | 84 |

### A London Outer Circle Railway.

IN the course of a paper read before the London Society, Mr. Alfred Crow raised again the subject of a proposed Outer Circle Railway for London, not only for present purposes, but with a view to the needs of the future. He suggested, in order to divert traffic from the central area, a circular railway, linking up the London and North Western Railway at Watford, the Midland at St. Albans, the Great Northern at Hatfield, and the Great Eastern (Cambridge line) at Broxbourne. Crossing thence to Epping, the existing line from Epping to Ongar would be utilised and a new branch formed connecting Ongar with the Great Eastern (Chelmsford and Southend lines) between Romford and Brentwood. Continuing southward, the existing branch line from Upminster to Grays and Tilbury must be utilised. A connecting link between the North Woolwich line at Canning Town and the Tilbury line at Plaistow (there is already a loop from Bromley to Canning Town), would bring the whole of the Victoria and Albert Dock system into direct communication with the great towns of the Midlands and the North, apart from the connection *via* Stratford. Extension of the London tube railway system along the whole of the riverside area, with stations at each of the docks and intermediate stations for the wharves and manufactories was also suggested. Beyond the Albert Dock a light railway service might be provided to Dagenham, Grays and Tilbury.

### Railway Progress on Argentine Railways.

IN view of the circumstance that among the South American Republics Argentina has been

* Of contractors' servants 5 were killed and 25 injured.

† Of contractors' servants 3 were killed and 118 injured.

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one of the greatest sufferers from the effects of the European War, it might have been reasonably supposed that at least some economy would have been exercised in fresh railway enterprise; but, as a fact, great activity has prevailed of late months in new railway construction, and, according to the information supplied by the Ministry of Public Works in Buenos Ayres, a very considerable amount of additional track has been joined up to the already important mileage in this Republic. Besides the extension and improvement of various parts of the railways of Argentina authorised by recent executive decrees, work has been of late undertaken—and is being vigorously pursued—on the following five national lines: A branch from Nare to San Jasief, 72 kiloms. in length; a branch from Pichanal to Oran, a distance of some 26 kiloms.; a line from Catamarca to Tucumán, of 186 kiloms.; a branch from Talapampa to Alémania, of about 11 kiloms.; and a branch from Metan to the east, measuring about 242 kiloms. in length. The new lines will, when completed and opened to traffic, bring up the total mileage of the Argentine Republic to well over 22,000 miles. At the end of 1914 this already amounted to 20,824 miles, or, say, 33,319 kiloms., of which 5,907 kiloms. were State-owned; 26,953 were those of private companies (mainly British); twenty were the secondary lines of the State, and the balance of 454 kiloms, were the secondary lines of private companies. The growth of the trackage in Argentina may be gauged from a comparison of the mileage open to traffic in 1912, which was not in excess of 32,035 kiloms., while in 1911 it had amounted to but 28,762 kiloms. Between the year 1905 and the year 1912 the number of passengers carried upon both the State-owned and the company-owned railways of Argentina increased from a total of 26,636,211 to 68,457,090; while the freight over the same period advanced from 2,409,995 tons to 33,640, 206 tons. In regard to the cost of running these systems and the revenue that they produced, the gross receipts, which totalled $71,594,796 in 1905, had increased to $119,333,796 in 1912, and the working expenses came out at $39,396,094 and $75,690,837 respectively for the two periods.

The new Retiro station of the Argentine Central Railway, which was opened to traffic on August 3rd of last year, with much ceremony, by the President of the Republic, is proving an immense advantage. It is worthy of note that of the 33,000 kiloms. of railway in the State above referred to, no fewer than 5,000 kiloms. belong to the Argentine Central system. The new freight-tunnel, which has been constructed at great expense by the Buenos Ayres Western Railway, connecting their station at Plaza Once with the port at Buenos Ayres, is, likewise, proving of inestimable value in handling the ever-growing freights received between the railway and the ships. The handling of this traffic is now conducted quite independently of the passenger traffics, thus avoiding delays and inconvenience to the travelling public and the management. Everything in the freight line now goes direct to the docks.

## Glasgow and South Western Railway Locomotives.

CORRESPONDENCE still continues in reference to the older engines of the Glasgow and South Western Railway. Mr. Niven writes: "I wonder if any readers will remember a class of 0-4-2 engine which were built by Neilson & Co. in the 'sixties of last century. They had a round window in the cab side. Many of Mr. Stirling's engines were like this. Nos. 149 and 150, known latterly as 149A and 150A, I remember well. These had gib and cotter side rod brasses similar to those of the big and little ends. The Allen straight link motion was also employed. I fired on one of these engines for a short period. She was on shunting work, but occasionally ran a cattle train or suitable goods work. The injector (there was but one) was a Gifford, placed outside the cab on the gangway plate, and the driver had to work it, as it was on his side."

"The 0-4-0 engines which were built by Mr. James Stirling in the 'seventies used to have the safety valves over the fire-box casing ring, but Mr. Smellie made new boilers for them. The numbers of these engines in Mr. Stirling's time were Nos. 5-7, 9, 25, 33, 34, 65, 66, 67, 68, 69, 70, 86, 87, 88, 89, 90, 91, 92, 93, etc. I particularly remember 86 in its original condition, with brass safety valve cover, Salter balance levers, and a wheel and screw to reverse the gear. As an 'R' engine she was attached to Greenock, working Inchgreen station branch. These engines all became 'R's' when Mr. Smellie built his six-coupled goods of the same numbers. No. 86 was the first tender engine to work on the Canal Railway in the early 'eighties. In 1885-6 she was an engineers' ballast engine. The present No. 86 is a 6 ft. 9 in. Smellie engine. The old No. 86 is now R33. The few engines of the class now remaining principally work colliery sidings about Dalry, Irvine, Stevenston, etc."

Many other letters have been received on this subject, and in view of the keen interest indicated, arrangements have been made for Mr. E. L. Ahrons to follow the Great Western Railway section of his articles by one devoted to the Glasgow and South Western Railway, before proceeding to the next section of his original programme of railways to receive attention.

## Harbour Improvements at Padstow, London and South Western Railway.

IN order to meet the demands for increased accommodation and facilities for dealing with the growing fish traffic at Padstow, and with a view to encouraging the still further development of this industry and also the shipment of china clay, etc., the Harbour Commissioners obtained an Act of Parliament in 1910 to carry out a scheme, including a new wet dock and pier. The latter has been constructed, 800 ft. in length,



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40 ft. wide, and 25 ft. 6 in. above the level of low water spring tide, and also forms the east wall of a proposed wet dock. Two sets of rails are laid on this pier, and they are connected with the railway company's sidings. The London and South Western Railway took over the remainder of the engineering work, and have already carried out about 300 ft. of quay wall which forms the west wall of the wet dock. Consequent on the construction of the new pier it became necessary to make extensive modifications in the station yard, involving considerable increase in the siding accommodation and the provision of new sites for the engine turntable and the truck weighbridge.

The extension of the covered fish market at the dock side next engaged attentjon owing to its being found inadequate to cope with the demands made upon it. The lack of space in this respect was met by extending the platform and roofing on the same lines as previously existing, and by this means nearly doubling the covered area. This increased market accommodation was also supplemented by the forming of a new roadway between the market and the dock side and adjacent sidings.

These works were all preliminary to taking in hand the heavier work directly connected with the deepening of the dock and the provision of extended quay accommodation. Simultaneously with the deepening of the dock the work necessary to provide increased siding and cart-road accommodation on the quay was executed. The face of the new dock wall was constructed of cement concrete blocks, each weighing about ¾ of a ton, laid in courses 2 ft. deep, header and stretcher alternately. These blocks were all made at the company's concrete depôt at Exmouth Junction. When the whole of the work is completed Padstow will have a fine wet dock of about 2½ acres, with a depth of water of 12 ft. below high-water mark of lowest neap tides, at all states of the rise and fall of the River Camel.

## Underground Railways and London General Omnibus Group.

At the May Operating Department Efficiency meeting of the London Underground Railways and General Omnibus Group, held at the L.G.O.C. Training School, Milman's Street, Chelsea, S.W., a paper on "Time-tables and Duty Sheets—comments and criticisms on methods and practice" was read by Mr. Evan Evans, of the Department of the Railway Superintendent of the Line. The chair was occupied by Mr. H. E. Blain, Operating Manager.

Mr. Evans traced the changes in the working of the Underground Railways connected with the Group, numerous slides being shown on the screen, the first showing the constant improvement effected in the frequency of the train service on the busiest section—that between South Kensington and Mansion House—during the busiest hour of the day. This had grown from twelve trains per hour in 1871 to forty-three in 1916. The influence on railway time-tables of physical limitations, both imposed by the line itself and the number of its stations and junctions, as well as by the influence of the connections with other railways, was pointed out.

Two standards are necessary in drafting a time-table in skeleton form, one being for an hour of the peak load and one for an hour of the slack service, and it is usual to stimulate traffic by providing a service ahead of the immediate needs with a view to development. On a time-table being put into operation, two points are kept under observation, to ascertain (*a*) how it fitted the needs of the traffic; and (*b*) how it worked. Attention to these matters has reduced the time occupied by trains over the tunnel section of the District Railway in the ratio of 49 to 27. Popularity and prosperity of routes is largely due to adequacy and punctuality of service, whilst unpunctuality carries in its wake disorganisation and uneconomical working.

## The Value of Traffic Facilities.

The railway lay-over facilities and coupling arrangements were described, and specimens of time-tables discussed. It was pointed out that the principle of non-stopping at specified stations had three distinct advantages:—(*a*) The assistance it gives in regulating the loading of the trains; (*b*) reduction in time occupied on the journey; (*c*) operating economy, enabling the rolling stock to run a greater mileage and reducing the current consumption. Two of these are directly to the advantage of the passenger.

There are different systems of non-stopping, that adopted on the Piccadilly line being called in America the "Skip-stop," trains passing alternate stations which are but a short distance apart. On the District Railway, the junctions are utilised to act as relief lines, a clear run for each train being obtained by arranging for the previous train to be cleared at a junction or itself to become a non-stop at a certain point. Methods of taking train loadings were described, together with the system of coupling and uncoupling additional carriages according to the traffic demands of different hours of the day.

In considering 'bus time-tables, it was found that, just as the introduction of electric working on the railways has permitted a decrease of from 25 to 30 per cent. in the running times, so the displacement of the horse 'bus by the motor 'bus has achieved an equivalent improvement and allowed of much longer journeys being undertaken, the increased facilities of through travelling being much appreciated by the public. The methods of the 'bus time-table preparation were described and the particular problems involved discussed, slides being exhibited of loading charts and other interesting data. The final portion of the paper dealt with the preparation of men's duty sheets, and the various systems in operation on both the railways and 'buses were described and analysed, it being pointed out that this portion of the work is an exceedingly important one, requiring the exercise of considerable knowledge and skill.

Discussion was opened by Mr. E. R. Peaty,

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Superintendent of the Time Schedules of the L.G.O.C., and taken part in by a number of the officials, some keen criticism resulting. The next paper of the series will deal with ticket systems.

### Drivers and Their Ways.

"In running locomotives," writes Mr. Niven "it is interesting to note how differently drivers work their engines. Some men have fixed rules, but seldom seem to investigate the causes therefor and effects realised. The writer has noted that the older generation of enginemen do not seem to appreciate that easy running depends on the maintaining of the boiler pressure upon the piston-head. Thus, if the pressure is 175 lbs. per sq. in. the regulator should be worked full-open with a load behind the engine, cutting-off in the cylinders as early as the load will permit of in order to maintain time with the train. I have noted drivers—and good drivers, too—who preferred to work the regulator half open and work well forward with the gear; but this is a mistake, as by doing so the engine is using a greater volume of steam in the cylinders. In starting away the regulator should be opened about one-fourth, with the running gear in full travel, allowing the engine to get away easily without chance of slipping too much. Too much steam at the start results in slipping. As the engine begins to feel the load and gains speed the reversing gear can be notched back to cut-off at 40 per cent., opening the regulator to one-half at the same time. After running at this for a distance of a few revolutions the gear can be put at 25 per cent., or at most 30 per cent., and the regulator opened out full. On a level road the engine will get into a swing and in due course a careful driver may partially close the regulator to suit the load. I have noted engines increase their speed by slightly *throttling* after the maximum cut-off was put in operation, the cause of this being that when too great a pressure is on the back of the slide-valves and the port opening is slight, as in running at 20 per cent., the engine cannot free itself quickly enough and becomes 'wrapped up.' Many engines have contracted exhausts to get steam quickly, and the most drastic strategy has to be resorted to to get them to run; but a free exhaust compatible with the duty of the engine is the most satisfactory for free running."

### "Travel by Ambulance Train": Told by a Patient.

An old reader, who has been serving his country in the field, and was, at the time of writing, a patient in a military hospital near Birmingham, sends particulars of his journey as a wounded soldier from "the Front." That he should have noted so many details, though a "bed patient," is a compliment to his keen interest in railway matters. He was conveyed across one of the London and North Western steamers to one of the Great Western turbine boats, which now serves as a hospital ship, and by which he travelled to England. He was then placed in a Great Central ambulance train, with two London and South Western corridor coaches attached for sitting-up cases. This was taken by a London and South Western 4–4–0 locomotive No. 710 right through to Cheltenham, over the Midland and South Western Junction Railway, a 4–4–0 engine of that company assisting from Andover, whence a non-stop run was made to Cheltenham. Being a bed patient he was unable to note the engine attached at Cheltenham, but after reversing near Barnt Green, destination was finally reached behind a Midland 0–6–4 tank engine and a 0–6–0 rebuilt goods engine. These particulars are of much interest, and we congratulate Mr. Tyrrell upon his observatory powers under such conditions. He also mentions some instances of unusual train working he has noted at various periods. (1) A Stirling rebuilt 4–4–0 engine (South Eastern and Chatham Railway) on London and North Western Railway hospital train at Eastleigh (London and South Western Railway); (2) Great Western Railway 0–6–0 engine on Great Western Railway troop train at Blackwater (South Eastern and Chatham Railway); (3) Troop train of Midland and Great Northern Joint stock at Kingsbury (Midland Railway), hauled by rebuilt Midland 0–6–0 engine; (4) London and North Western Railway troop train at Basingstoke (London and South Western Railway) headed by Great Western Railway 4–4–0 engine.

Mr. Tyrrell also refers to the fact that recently he noted a Midland express hauled by two rebuilt superheater 4–4–0 engines of consecutive numbers (518 and 519), and asks whether this is not a decidedly unusual occurrence. Several such instances have been mentioned in these pages at various times, but we may recall an editorial reference some years ago to the fact that at Perth station two North British trains had been noted, standing at adjacent platforms, one for Edinburgh and the other for Glasgow, the former being headed by Nos. 662 and 663, and the latter by No. 664, all three being Holmes 4-4-0 engines of the same class.

### Clerical Goods Workers.

Staff problems involved by the enlistment of railwaymen in large numbers, have been solved on sections of the Great Western Railway by the call for volunteers from the clerical staff to assist in the work of despatching goods in the evenings after their office work was completed, in order to keep stations clear for the reception of incoming traffic. There was a ready response, more than sufficient men being forthcoming for the work, and at many places valuable work is being done in this way. About 100 members of the clerical staff were engaged at Paddington, 30 at Smithfield, 50 at Birmingham, and many others elsewhere. The work involved is of an altogether different character from that to which the volunteers

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had been accustomed, but they have rendered most useful service. A gratifying feature of the arrangement is the pleasant relationship established between the workers of all grades, the old hands having co-operated willingly and effectively in making the recruits efficient in their duties.

### A New Argument for the Channel Tunnel.

EDITORIAL reference in our Great Western Railway contemporary directs attention to what is apparently a novel, though important, argument in favour of the consideration of the proposed Channel Tunnel.

In an address to the Rome branch of the League of Britons Overseas, on "Anglo-Italian Problems of the Near Future," Professor Luigi Luiggi, D.Sc., M.Inst.C.E., President of the Italian Society of Civil Engineers, referred to the desirability of increasing interchange between Italy and Great Britain. He strongly advocated, in default of actual railway communication, as *viâ* the proposed tunnel, the provision of a railway service across the English Channel, by means of ferry-boats, so that trucks loaded at factories in England could be run to their destinations in Italy, and *vice versa*.

Prof. Luiggi pointed out that there were many classes of valuable perishable and fragile merchandise that could not stand the delays and roughness of sea-passage between the Mediterranean and British ports. Besides, transport by sea involved much careful and expensive packing, which would largely be saved if railway trucks could run between the two countries, and the British manufacturer would be enabled to compete more successfully with Continental rivals.

For several years, while Prof. Luiggi was one of the directors of the Italian State Railways, he used every effort to import British rolling stock instead of German, but notwithstanding the great advantage of better workmanship to be gained in ordering from England, the expense became prohibitive in comparison with the German, because the rolling stock, when once ready at the British factory and all properly fitted together, had to be taken to pieces again, packed, delivered to dock, shipped, carried by sea to an Italian port, unpacked, landed in some factory, put together again by British and Italian workmen, varnished, tested, etc. On the other hand, rolling stock from Germany, once fitted in the factory, could be hauled to Italy on its own wheels and put into service as soon as it crossed the frontier.

### Midland Railway Locomotives Sold to Italy.

IN 1908, Prof. Luiggi improvised a temporary service of ferry-boats for the transportation of fifty locomotives which were ordered for the Italian State Railways from the Midland Railway Company. The locomotives were tested in Derby and sent under their own steam to Goole, where a powerful crane lifted them bodily on to the deck of one of the steamers that plied regularly with Dunkirk. Each steamer carried two locomotives. At Dunkirk they were landed by means of a crane, the connecting-rods taken off, the locomotives hauled across France to the Italian frontier, where the connecting-rods were replaced, steam raised, and the locomotives started service on the Italian railways. If the fifty locomotives could not have been ferried across the Channel the Italian State Railways would have been obliged to go to another country for their supply.

The distance from Goole to Dunkirk is about 200 miles—nearly ten times that between Dover and Boulogne, where, Prof. Luiggi pointed out, the crossing could be done in so short a time as would permit of making sure of the weather conditions before leaving the harbour. He contended that the possibility of trade between Italy and Great Britain depended upon the existence of a railway ferry, and from his experience of preparing the plans and carrying out the work for a ferry service between Italy and Sicily and his investigations of similar services in several countries, he was confident that the provision of a railway ferry across the English Channel presented no greater difficulty than had been surmounted elsewhere.

### Suggestions and Inventions.

To secure the co-operation of employees in promoting the progress and development of the undertaking, the Great Western Railway established in 1913 a permanent Suggestions Committee, to which ideas on all matters affecting the organisation, conduct and operation of the Company's business were invited to be sent. Rules governing the reception and method of dealing with these ideas were laid down, the leading principle being an absolutely impartial consideration of all proposals, and gratuities or other suitable acknowledgments were promised in cases where ideas were recommended for adoption, patent fees being paid in cases where such ideas were patentable.

Since the formation of the Suggestions Committee, two and a half years ago, reports our Great Western Railway contemporary, 2,775 suggestions have been received, and despite the large reduction in staff due to enlistment with the Colours, there has been no falling off in the number of ideas submitted for consideration. The second annual report of the Committee, covering the work for the year ended March 31st, 1916, shows that during this period 1,106 suggestions were received and dealt with.

During the year monetary awards to the amount of £113 4s. were made in respect of suggestions recommended. This total compares with £99 15s. 6d., the amount of the awards made in connection with the 131 suggestions recommended during the first year-and-a-half of the Committee's work. Not only, therefore, have the number of recommended suggestions increased from 9·6 per cent. to 15·2 per cent. of those dealt with, but the ideas themselves have

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been of a more valuable character than those formerly submitted, and have been, in practically every case, already put into operation.

**Ideas Which Have Been Adopted.**

A FEW of the more valuable proposals which have been adopted on the recommendation of the Committee may be mentioned :—

*Goods Guard.*—To obviate the number of breakages of red glass shades for side lamps, a pocket to be provided for the shade when not in use.

*Clerk.*—As a temporary measure during the war, the Roberts Road entrance to Acocks Green station to be closed between the hours of 7 and 5 p.m., thus releasing a clerk and a ticket collector.

*Signalman.*—An additional crossover road to be laid down on the Old Hill branch at Netherton Junction station, in order to save delay to bank engines and goods trains.

*Station Master.*—A step to be fixed on the end of corridor coaches, to enable men to remove or replace side lamps when the coach is not standing at the platform or the lamp iron is on the side away from the platform.

*Painter.*—The keys in the spectacles of signal glasses were formerly slack, thereby causing the putty to break away from the spectacles and the glasses to be cracked or broken by the vibration of loose keys. A suggested screwed clamp was, therefore, adopted, with the result that less breakages occur, less putty is used, and glasses can be taken from old spectacles and used again.

*Carriage Examiner.*—To prolong the life of brake blocks an extra hole to be put on the take-up rods of the new pattern goods brake vans, and the safety loops to be carried about three or four inches towards the blocks and small part of the bow girder.

*Second Group Fireman.*—Gland packing for engines to be supplied by length instead of by weight.

*Telegraph Instrument Maker.*—Improved design for signal lever catch rod contacts in connection with electric locks.

*Fitter.*—Improvements in electric train staffs, electric tablet catchers, and rail bonds and tools for track circuits.

During the year two patents were taken out for members of the staff, the cost of searches, preparation of specifications and plans, and the patent fees up to and including that payable on the sealing of the patent having been borne by the Company. The first related to a design for a wagon sheet-supporter, submitted by a locomotive fireman. This has been experimentally placed on a number of wagons with good results, and is being given a more extended trial with a view to its general adoption. The second, forwarded by a member of the clerical staff, is for a train-indicating appliance in the form of a card record, to facilitate the work of train controllers. It has been installed in the London, Bristol, and Westbury divisions.

Suggestions continue to be received from all grades of the staff, 1,067 employees having taken advantage of the invitation to submit them since the initiation of the scheme. The ideas cover all phases of railway working.

**Engine Sheds on the Lancashire and Yorkshire Railway.**

A LANCASHIRE reader, Mr. E. C. Bourne, sends a list of engine sheds on the Lancashire and Yorkshire Railway, with their numbers, as follows :—

1. Newton Heath.
2. Low Moor.
3. Sowerby Bridge.
4. Leeds.
5. Mirfield.
6. Wakefield.
7. Normanton.
8. Barnsley.
9. Knottingley.
10. Goole.
11. Doncaster.
12. Hull.
13. Agecroft (Salford) and York.
14. Bolton.
15. Horwich.
16. Wigan.
17. Southport.
18. Liverpool (Sandhills).
19. Liverpool (Aintree).
20. Bury.
21. Bacup.
22. Accrington.
23. Rose Grove.
24. Colne.
25. Lower Darwen.
26. Hellifield.
27. Lostock Hall.
28. Chorley.
29. Ormskirk.
30. Fleetwood.
31. Blackpool (Talbot Road).
32. Blackpool (Central).

**Lancashire and Yorkshire Railway Tank Engines.**

MR. BOURNE mentions that the 1910 series of 2–4–2 tank engines are 15 only in number, Nos. 1526–1540. Also that the twenty 2–6–2 tank engines which shared the Manchester, Oldham, Stalybridge traffic are now replaced by 2–4–2 superheater tanks (227 class). The 2–6–2 engines are now principally employed in heavy shunting and banking duties. Among the 2–4–2 tanks, No. 267 (No. 5 class rebuilt), 1528 (No. 1526 class), both of Colne, and No. 1380 (1008 class rebuilt), of Newton Heath, have been fitted with mechanical lubricators and superheaters. The Holcombe Brook electric train service has not yet been resumed, but is expected to be shortly. Both motor cars have been repaired. Electric trains on the Manchester-Bury route are on Sundays composed of third-class cars only, and run every half-hour from 7.50 a.m. to 10.20 p.m. In reference to the "pooling" of railway tarpaulins, etc., Mr. Bourne mentions that at Bury he noticed recently a Lancashire and Yorkshire truck sheeted with a Great Eastern Railway tarpaulin, and in June last



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year at Northallerton he saw a train of London and South Western Railway close-coupled suburban coaches.

**Unusual Locomotive Working.**

In connection with previous paragraphs under this title, Mr. Laurence H. Carr states :—"On Friday, June 16th, I saw Great Central Railway locomotive No. 801, a 0–6–0 tender goods engine, at Carlisle. It seems likely that this engine had been loaned to the Caledonian Railway [This we understand to be the case.—Ed. R.M.], for it hauled in from that line, a workmen's train of London and North Western stock, which was then taken forward to Penrith by a London and North Western locomotive."

Mr. G. H. Cannon also mentions, in reference to Mr. E. Moody's paragraph on page 70 of the July Railway Magazine, that he has seen London and South Western 4–4–0 locomotives Nos. 280, 287, 384 and 710 at Cheltenham on Red Cross trains. He also states that No. 139 is to be seen regularly working the 3.0 p.m. *ex*-Cheltenham, Midland and South Western Junction Railway. The latter line had further borrowed Midland 0–6–0 goods engines Nos. 3385, 3464, 3689, and Great Western 0–6–0 goods No. 2409, besides several 0–6–0 tanks, which work in the Ludgershall district. Concerning the repair of Scottish locomotives to railways in England, in April he saw Caledonian 4–6–0 engine No. 918 at Messrs. Robt. Stephenson's works at Darlington.

**War Time "Liveries" for Locomotives.**

A long-standing reader comments upon the statement that many Great Western Railway locomotives are now painted "khaki" colour, and remarks that the tint adopted, when new, does not suggest khaki in its most generally accepted shade? The brown appearance of khaki gives place to the olive green shade now so familiar on military motor vehicles. As the new tint when first applied has a highly lustrous finish, the locomotives when freshly painted compare very favourably with those still clad in the old shade of green. "The most handsome appearance of any locomotive in the new livery" is, in his opinion, presented by No. 4381, of the 2–6–0 (outside cylinder) type. "The only blemish in the new colour scheme is the black buffer-beam. Surely a little more khaki paint might have been applied here to give a better finish. In the later engines painted in this shade the coat of arms in coloured transfer between the words Great Western has been omitted. The Great Western Railway has now three standard colours for the painting of its locomotives. The bulk of the stock is still painted the familiar green; locomotives used for auto-working are painted a Midland shade of red—officially described as brown—and now khaki has made its appearance."

Some of the South Eastern and Chatham locomotives are being painted black with white letters and restricted lining out. In other instances the lettering appears to be more of a yellow tint, and some of the tender engines have large numerals of Midland type placed between the initials S.E.C.R. On the Great Eastern Railway a plain coat of grey now has to suffice, but this soon becomes dingy and after a time is difficult to distinguish from the blue engines which have been a considerable time out of the paint shop.

**Smart Railway Construction.**

The Grand Trunk Railway of Canada recently carried out a remarkably fast piece of construction work in connection with the extension of its lines into Camp Borden, the new military training ground around Allandale, Simcoe County. Within a few hours of the purchase by the Government of the 20,000 acres of plateau land which comprises the camp, the Grand Trunk had its engineers on the spot, and they were followed immediately by a large force of steam shovels and track-laying equipment. As the result of rapid track-laying it has been possible to take into the camp by rail thousands of tons of materials of all descriptions. The Grand Trunk has already constructed over nine miles of tracks into and within the camp, while they are building a large, permanent station 430 ft. long by 30 ft. deep to take care of the great passenger traffic which will develop when the 40,000 troops to be trained at the camp arrive. The Grand Trunk station is within a few yards of the camp headquarters and near by are side tracks and "Y's" capable of handling freight and supply trains. The camp grounds were purchased on May 10th, and on June 15th, when the troops go in, there will be a great series of concrete buildings and miles of sewers and water supply conduits, making this not only the largest, but the best military camp in America.

**Strengthening of Charing Cross Railway Bridge.**

Reference was made last month to the proceedings in Committee of the House of Lords in connection with the Parliamentary Bill promoted by the South Eastern and London, Chatham and Dover Railways, and concerned mainly with the strengthening of Charing Cross railway bridge. On Monday, July 3rd, the unusual course was taken by the House of Commons—unusual in the sense that it is generally accepted that the proceedings in Committee are intended to thresh out the *pros* and *cons* of the matter, when evidence can be tendered or called, and statements made, challenged and either supported or controverted—of rejecting the Bill by what was, apparently, somewhat of a "snap" division, seeing that the 25 votes in favour of the second reading and 67 votes against, only make a total of 92, out of a total possible voting strength of over 600. This suggestion is further supported by the fact that out of 32 railway directors who are members of the House of Commons only two appear to have been present at the time.

The position is undoubtedly a peculiar one; but while a vast amount of rhetoric and printers' ink has been expended in advocating the replacement of what is admittedly not an artistic structure by a new and more æsthetic erection,

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no real scheme has matured or appears likely to mature. Consequently, the railway companies are to be prohibited from doing what is necessary to enable their bridge to be strengthened up to its traffic capacity, while architects and various authorities are talking about a plausible scheme for something entirely different and which may be years in even reaching the stage of actual design with a view to construction, with a further indefinite period for erection.

Incidentally, it may be pointed out that although Mr. John Burns endeavoured to make a special point of the Hankey's Mansions scheme, thrown out on the Third Reading, and which led the way to the London County Council improvements between the Victoria Tower, Westminster, and Lambeth Bridge, it was not until *fourteen* years later that the latter scheme was carried out. This rate of progress for a matter of the kind in question does not suggest great possibilities for a scheme of so much greater magnitude and involving special problems, not the least being the position of the railway companies concerned, and the necessity for reconciling a multiplicity of proposals, none of which has yet been properly formulated.

Proposals for a new bridge, whether as a Kitchener memorial, or merely with a view to the improvement of the Metropolis, and for a new south-side terminus in the neighbourhood of Waterloo station, are undoubtedly attractive and read very speciously when the element of cost is referred to only very generally. But in practice matters of this kind are not so easily dealt with, and while due regard may be given to the advocates of a "beautiful London," traffic convenience is a far more important matter, and London owes a responsibility to the railways which have provided it with transport facilities, often at enormous expense, as was the case with the extension to Charing Cross, and to the millions of travellers to whom it is a matter of real importance whether they are landed on the north or the south side of the river. It is only necessary to compare the relatively small numbers of passengers using Waterloo Junction, other than for interchange with the London and South Western Railway, with those detraining and entraining at Charing Cross, to realise how the votes of passengers, who are primarily concerned, would poll.

Were it possible to compare one concrete scheme with another the situation might be different; but that is not the case here. A definite practical necessity has, in fact, been sacrificed to airy proposals, which, if ever they are realised, will inevitably involve enormous expense, though in view of the definite action taken by Parliament, it will now be very difficult for the London County Council to go on deferring the formulation of a scheme on the lines suggested.

Incidentally, in view of the special attention now given to the workmen's traffic and facilities, it is strange that no regard was paid to the statement made by Mr. Stuart-Wortley that from 1905 up to the date of the war, the number of passengers carried rose from 10,000,000 to 13,000,000 per annum, and at the time of the outbreak of war, of these 13,000,000, 6,000,000 had workmen's tickets. The main point that the strengthening is imperative to enable traffic to be properly worked, seems to have been lost sight of altogether. Yet this matter would in no way operate against any future proposals such as those suggested, and any reduction of train facilities would probably be resented most strongly by those who now most strenuously oppose necessary strengthening works.

### Stirling Engines on the South Eastern and Chatham Railway.

MR. C. A. HUNT writes: "Referring to the paragraph on page 70 of July issue, relating to Mr. Stirling's 7 ft. express engines on the South Eastern and Chatham Railway, it is rather curious that while some of these engines are being rebuilt a second time, a few have not been rebuilt at all. I have seen one recently at Charing Cross with domeless boiler and original Stirling cab, painted all over a dull unvarnished black, with the number in white figures, about 18 in. high, upon the tender. As all the real express work is now monopolised by the Wainwright and Maunsell engines, especially since the withdrawal of most of the Continental Boat Trains, the Stirlings have to be content with second-grade trains, as well as all kinds of miscellaneous duties which could not be described as even second-grade. Thus they appear to have a complete monopoly of the Reading traffic, they may be seen on the Maidstone and Ashford branch, where grades are severe and stops are frequent, they haul suburban trains terminating no further out than Addiscombe Road, and even on the steep climb to the Crystal Palace. These duties seem very unsuitable for engines with 7 ft. wheels, and never give them a chance of getting into their stride."

### The Railway Magazine for Neutral Readers.

OWING to Censorship regulations British magazines can only be posted to neutral countries in Europe and America by those holding special permits. The Railway Publishing Company, Ltd., holds a permit to post the RAILWAY MAGAZINE and copies will be sent by the Manager on the following terms:—To neutral countries (by ordinary post) 8d. per copy, or 7s. 6d. per annum. Remittances should be sent to 30, Fetter Lane, Fleet Street, London, E.C.

### Engineering Books for War Prisoners.

GIFTS of standard text-books on engineering subjects for distribution amongst British prisoners of war who are interned abroad, are solicited by the Board of Education. All parcels of books and communications on the subject should be addressed to Mr. A. T. Davies, Welsh Department, Board of Education, Whitehall, London, S.W.

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AT a meeting of the Board of Directors of the North British Railway, Mr. Richard Brown was appointed Audit Accountant in succession to the late Mr. John Sinclair. For fourteen years Mr. Brown has held the post of chief assistant in the department of which he has been appointed head. Educated at Edinburgh Schools, he began his career with the North British Railway Company in January, 1882. After seventeen years' indoor experience he was appointed station auditor. Subsequent promotion resulted in his appointment as chief assistant to the Audit Accountant.

* * *

AFTER many adventurous voyages, the Great Eastern Railway steamer *Brussels* has been captured by German torpedo-boats or destroyers operating from Zeebrugge. The vessel left Rotterdam on a Thursday night for England in command of Capt. Charles Fryatt, with an all-British crew of forty-four officers and men. In addition to cargo, she had on board a number of Belgian women and children refugees. Her cargo consisted of margarine, fish, butter, and yeast. Built by Messrs. Gourlay Brothers and Co., of Dundee, in 1902, the *Brussels* was one of the older vessels engaged on the Continental services. Her registered tonnage is 1,380, and horse-power 3,900. She has a speed of 15½ knots, and is fitted with wireless and submarine signalling apparatus.

* * *

WE regret to record the death of Mr. F. G. Norris, Assistant District Superintendent, London District, London and South Western Railway, while on a short holiday visit to Exeter. Although he had been ailing for a long time, it was hoped a short stay in his native county would prove beneficial. Mr. Norris passed peacefully away at the residence of his father, who, it will be remembered, was for many years Chief Inspector in the Western District and afterwards Stationmaster at Broad Clyst. The late Mr. Norris's career as a railwayman commenced in 1884, when he was appointed junior clerk in the District Superintendent's Office at Exeter, under the late Mr. George T. White. When the latter became Superintendent of the Line he selected Mr. Norris for position in the special Traffic Department. After a short lapse of time he was given charge of the department, and as Chief Special Trains' Clerk was mainly responsible for arranging some of the greatest transport movements ever undertaken by any railway company. When, in June, 1912, the traffic districts were rearranged as "London," "Central," and "Western" respectively, Mr. Norris was appointed Assistant District Superintendent of the London District.

* * *

A HANDSOMELY illuminated address and album have been presented to Mr. A. A. Shepherd, Works Manager of the Carriage and Wagon Department, London and South Western Railway, Eastleigh. The presentation was made by Mr. Surrey Warner, Carriage and Wagon Superintendent, who was supported by Mr. Hugh Drummond (Chairman of the London and South Western Railway Company), Sir Herbert Walker (General Manager, London and South Western Railway), Mr. R. W. Urie (Locomotive Engineer), and other gentlemen.

* * *

MR. J. E. ABDEY writes:—"I observe on page 454 of your June issue a reference by a correspondent to Great Western Railway 0-4-0 saddle tank engine No. 95 of unusual appearance seen at Chester. Although I do not remember the number of the engine, it is evidently the small engine used for shunting in Saltney Yard during part of the year. It usually made its appearance about March, remaining till May, for the purpose of working over the Great Western Deeside branch to Messrs. Webb's and Messrs. Proctor and Ryland's Patent Manure Works, whose 'season' is in full swing at this period. On this branch there are sharp curves and the line is unsuited to larger engines. The engine was certainly not altogether Great Western in appearance. It had no cab nor weatherboard, nor any bunker, and was fitted with a species of spout in lieu of the orthodox copper-capped chimney—no doubt to allow of low bridges being negotiated, as I believe the engine worked on colliery branches in the Wrexham and Ruabon districts when not at Saltney. Where or when it was built I cannot say, but Stafford Road, Wolverhampton, was its home. It was generally referred to as *The Coffee Pot* by the men who worked with it. As it approached, the cranks could be seen working up and down underneath it, presenting a remarkable appearance."

* * *

THE North British, Caledonian, Highland, and Great North of Scotland Railways have discontinued the conveyance of passengers' luggage under the "Carted Luggage" arrangement.



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The Glasgow and South Western Railway is not, apparently, included in this agreement.

* * *

PUBLIC notices have recently been exhibited with the intimation that, in future, railways will require *each* article of passengers' luggage to have an addressed label affixed thereto—giving name and destination of the owner; and, further, that all old labels must be obliterated before luggage can be accepted for conveyance.

* * *

NEW North Eastern Railway time-tables taking effect from July 14th include the following alterations: The 3.57 a.m. train from York to Newcastle *viâ* Stockton and Wellfield runs *viâ* Stockton and West Hartlepool and is retimed. The 5.45 p.m. train from Newcastle to Edinburgh has ceased to stop at Beal. The 5.45 p.m. train from York to Thirsk leaves at 5.40 p.m., and the 9.13 p.m. train from York to Newcastle at 9.24 p.m. The 9.20 p.m. train from York to Saltburn starts at 9.31 p.m., and the 10.8 p.m. from Darlington to Newcastle at 10.19 p.m. being also accelerated. Other changes are mainly of a local character.

* * *

COMMENCING July 1st, the 3.32 p.m. (Saturdays only) Great Northern Railway Peterboro' to Newark does not run beyond Grantham; the 5.30 p.m. express from King's Cross to Newcastle, Leeds, Bradford and Hull arrives Grantham 7.31 p.m., departs 7.34. Doncaster is left at 8.36 p.m. for York, and 8.45 p.m. for Leeds. The 6.35 a.m. York to Doncaster no longer calls at Naburn to take up passengers for Doncaster and south thereof. The 8.15 p.m. from Grantham to Lincoln leaves at 8.0 p.m. in connection with the 5.30 p.m. from King's Cross. The closing of Thorneywood, Sherwood, St. Ann's Well and Linby stations has involved a number of alterations in the Nottingham district.

* * *

MR. J. PEPPER, who has been Southern divisional assistant, Chief Goods Manager's Department, Midland Railway, has been appointed London Outdoor Goods Manager. Mr. Pepper went to the Midland at Derby from Messrs. Vickers' Sons and Maxim, Barrow-in-Furness, in March, 1908.

* * *

MR. TONMAN MOSLEY, Chairman of the North Staffordshire Railway, who has been raised to the peerage, has taken the title of Baron Anslow of Iver. Anslow is the name of a village forming part of the Mosley's Rolleston estates, Burton-on-Trent, where the new peer spent his boyhood, and Iver is the Buckinghamshire market town near Mr. Mosley's present seat, Bangors Park.

* * *

THE London, Brighton and South Coast Railway now provide an additional boat from Portsmouth Harbour to Ryde at 7.10 p.m., in connection with trains leaving Victoria 3.55 p.m. and London Bridge at 4.50 p.m. Passengers by these trains are, therefore, able to get through to Ryde, Sandown, Shanklin, and Ventnor.

IT is pleasing to know that the Chief Commissioner for Police has sanctioned the fitting of seats for conductors on the London General Omnibus Co.'s motor-'buses. The seats are being fitted on the back platform of the 'buses and are of neat design, constructed to fold up when not in use. It is hoped that in a short time every London General Omnibus will be equipped with one of the new seats, which will be of special service in adding to the comfort and well-being of the large numbers of women who are filling the places of male conductors now on war service.

* * *

MR. F. W. CROSSLEY, an Irish railway man, is the author and composer, and Messrs. Pitman, Hart & Co., Ltd., London, are the publishers, of a new topical patriotic song entitled "Liza Says." Price is 6d. and copies can be had from Messrs. Wyman's bookstalls. It is being sold to provide comforts for railway men serving with the fighting forces.

* * *

AT the Michaelmas and Lent Term Examinations in connection with the Manchester University Classes of Railway Economics, Mr. P. Wood, agent's clerk, Great Northern Railway Goods Department, Doncaster, and formerly of the Great Northern Railway Mineral Manager's Rates Office, passed in the first classes in railway law, railway geography, railway rates, and transport history, and was awarded a higher number of marks than that given to any other student. Mr. Wood also achieved a similar result in the winter of 1913–14.

* * *

THE 10.25 a.m. express from Euston, London and North Western Railway, has again become a Liverpool and Manchester non-stop express, with a summer 11.0 a.m. for the Cambrian line and North and Central Wales, running non-stop from Willesden to Stafford. The trains between Watford Junction and Croxley Green and Watford Junction and Rickmansworth are now first and third class except the 6.59 p.m., Watford Junction to Croxley Green, and 7.10 p.m., Croxley Green to Watford, which are one class only.

* * *

"WITH reference to the comment made by Mr. E. Moody in the July RAILWAY MAGAZINE, on my note in June on London and South Western engine working over the Somerset and Dorset Railway, it is hardly necessary for me to explain," writes our original correspondent, "that 'north of Templecombe' had a limited significance applying only to the Somerset and Dorset line between that station and Bath. When travelling over the Midland Railway between Gloucester and Cheltenham recently I thought that I noticed a South Western locomotive standing on one of the many lines in that neighbourhood, but was too far away to be positive. It is always pleasant to find that a contribution from my pen has elicited a comment from another reader."

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NOTWITHSTANDING the cancellation of the usual annual sports arranged by the London and North Western (London) Athletic Club, "Children's Day" has been celebrated at the splendid Wembley ground with great success. Selections of music were given during the afternoon by Bayston's Orchestra, which also played some dance items in the evening. About 150 children sat down to tea, and rendered full justice to the ample supplies provided. Prizes were handed to the successful competitors by Miss Grasemann. Mr. Cecil F. Grasemann, Chairman of the General Council of the Athletic Club, armed, as usual, with the megaphone, delighted the large gathering at the prize distribution by his happy witticisms. Mr. Arthur C. Chapman, who was responsible for the entertainment portion of the programme, thanked Mr. Grasemann and Miss Grasemann for their presence and for the help that Mr. Grasemann gives to members of the Staff and to members of the Athletic Club. A special feature was two dances given by the lady members of the London Staff Operatic and Dramatic Society. The dances were arranged by Miss Nancy Borrett, and the pretty gavotte (for which the dance music from "Mignon" [*Ambroise Thomas*] was played), most of the members had seen before, it having been given with great success in the third act of the Society's production of "Les Cloches de Corneville" recently. Another prettily-arranged old country dance (for which the Merrymakers' Dance, "Nell Gwynn" [*German*] was played) was very daintily given, and was loudly applauded. The varied programme also included some much appreciated vocal items.

* * *

A READER comments upon the fact that the illustration of Great Central Railway 4–6–0 locomotive No. 279 *Earl Kitchener of Khartoum* reproduced on page 60 of the July RAILWAY MAGAZINE shows a top-feed arrangement. He mentions that the same feature is included in the 2–6–4 tank engines of the same railway. It is understood that the "top-feed" feature is now included in many of Mr. Robinson's engines.

* * *

WE record with regret the death of Mr. Thomas William Worsdell, well known as locomotive superintendent of the Great Eastern and North Eastern Railways, though it is a number of years since he retired from the latter post. He was also prominently associated with the two-cylinder system of compounding which bears his name. Mr. Worsdell was born at Liverpool on January 14th, 1838, his father being at that time the superintendent of the coaching department of the Liverpool and Manchester Railway. In 1865 Mr. T. W. Worsdell went to the United States to enter the service of the Pennsylvania Railroad. He was soon appointed master mechanic, and was given charge of the principal works at Altoona, Pa., and of the construction of engines, cars, machinery, etc., as well as of iron bridges. Mr. Worsdell remained with the Pennsylvania Company six and a half years, but a vacancy then occurring in the locomotive department at Crewe, he was offered the position of manager of the works, which he accepted, and returned to England in 1871. He held this position ten years. In the beginning of 1881 Mr. Worsdell was appointed locomotive superintendent of the Great Eastern Railway. In 1885 he was offered and accepted the post of locomotive, carriage and wagon superintendent to the North Eastern Railway, and early in that year took charge of that department, remaining unto the end of 1890, when failing health caused him to retire. He continued as consulting engineer for the mechanical departments, his brother, Mr. Wilson Worsdell becoming chief mechanical engineer. Mr. T. W. Worsdell retired altogether about the beginning of 1893.

* * *

THE Great Central Railway announces that from July 3rd the working of the Manchester South Junction and Altrincham Railway has been transferred to their control with Mr. T. W. Guest as superintendent. This arrangement will remain in force for five years, the Great Central Railway having taken over the control from the London and North Western Railway, who have been responsible for the working of the latter for the last five years.

* * *

CUFFLEY to Hertford, the Great Northern Railway line now under construction, was explored by a large party of Railway Club members on a recent Saturday afternoon. The Great Northern Railway very courteously gave permission for the visit, and Mr. Handley, Resident Engineer for the new line, acted as cicerone. Mr. Handley's explanations of the various engineering problems connected with the work, and the way in which the difficulties had been overcome, were much appreciated by his auditors. Hauled in two open and primitively-seated trucks behind rebuilt Hudswell Clarke 0–6–0 tank engine *Bowden*, the party made a fairly comfortable but decidedly interesting progress over the line. Bayford station, between 2 and 3 miles from the new Hertford station, was, like the latter, fully inspected, but the principal claims on the attention of the party were made by the Hertford viaduct, Horns viaduct, and Bondsbourne tunnel. Horns viaduct includes a 7 span bridge 46 ft. high with one skew span across a stream, while Bondsbourne tunnel is 2,680 yards long. Mr. E. J. Miller, the Hon. Secretary of the Club, is to be congratulated on the success of his arrangements.

* * *

MONTHLY meetings of the Railway Club for the purpose of reading papers and discussing railway subjects and locomotive problems will be resumed at headquarters, 92, Victoria Street, S.W., on Tuesday, October 10th, and will take place on the second Tuesday of each month during the forthcoming winter and spring. Particulars of further Club outings and meetings will shortly be announced. Mr. B. J. Hubbard,

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a member of the Club, is congratulated by the RAILWAY MAGAZINE on being gazetted as a second lieutenant in the Grenadier Guards. RAILWAY MAGAZINE readers are reminded that membership in the Railway Club is open to all who are interested in railways professionally or otherwise, and there is a special low subscription for country members.

* * *

FROM Corporal Karl Ffitch, a Railway Club member now a prisoner in the hands of the Germans at Giessen, the honorary librarian, Mr. H. W. Bardsley, has received a postcard as follows —"Since January 25th, 1915, have been prisoner of war. Left hand rather badly smashed by bullet and permanently somewhat useless. Otherwise fit and well and hoping to see you all shortly. Drop me a line when you can. Perhaps you could send me a railway book or two, printed prior to war—a Railway Year Book, for instance."

* * *

CHANGES in Chief Traffic Manager's Department, Great Eastern Railway (Operating and Commercial Sections) are announced as follows: *Southern Division*, viz.:—Main Lines (and branches) South of Cold Norton, Ingatestone, and Roydon, Mr. G. Keary, Divisional Superintendent of Operation; Mr. H. E. Roper, Divisional Commercial Superintendent. *Northern Division*, viz.:—Main Lines (and branches) North of Brampton, Burston and Barnham, and East of Shippea Hill, King's Lynn and Heacham; Mr. H. W. C. Drury, Divisional Superintendent of Operation; Mr. W. H. Hall, Divisional Commercial Superintendent. *Eastern Division*, viz.:—Main Lines (and branches) South of Beccles, Tivetshall Junction, and Thetford Bridge; East of Chippenham Junction, Bartlow, and Dunmow, and North of Shenfield Junction, and Woodham Ferrers Junction; Mr. M. Bedford, Divisional Superintendent of Operation; Mr. P. Syder, Divisional Commercial Superintendent. *Western Division*, viz.:—Main Lines (and branches) north of Broxbourne Junction, and west of Felstead, Haverhill, Kennett, Lakenheath, Middleton and Sedgeford; Mr. J. S. Fitzjohn, Divisional Superintendent of Operation; Mr. E. Robinson, Divisional Commercial Superintendent. Divisional Superintendents of Operation deal with operating matters including locomotive running, and Divisional Commercial Superintendents with commercial business in respect to both goods and passenger traffic.

* * *

MR. C. J. SELWAY, superintendent of the line, Great Northern Railway, has sent the following circular to persons to whom gratuitous copies of the company's time-table books have hitherto been sent:—"On account of the necessity for economy in paper consumption, it has been found necessary by the railways to considerably curtail the issue of their time tables, and to suspend the usual distribution of gratuitous copies. For this reason, therefore, no further gratuitous copies of the Great Northern Railway Time Book are being distributed, and I shall be glad if you will kindly take steps to ensure that the last copies supplied to you (dated '12th July, 1915, until further notice') are withdrawn from use after the 13th July, 1916, from which date new time tables will be issued. If covers for the time books have been supplied to you in the past, I shall be glad if you will kindly see that these are carefully preserved for use in the future. A limited number of Great Northern time books will be on sale at the Company's stations, town offices, and Messrs. W. H. Smith and Son's Bookstalls, price 3d., by post, 5d."

* * *

CONSEQUENT on the retirement of Mr. Armstrong, New Works Engineer, Great Western Railway, as stated on another page, the department has been amalgamated with the maintenance engineering section of the line under Mr. William Wylie Grierson, M.Inst.C.E., Chief Engineer.

* * *

FROM their London office, 12, Waterloo Place, Regent Street, S.W., the Italian State Railways send a fine pictorial poster illustrating the type of country where Italy is fighting, the view representing a section of the Dolomite region and showing the magnificent rock formations.

* * *

AT a meeting of the East Indian Association, Mr. H. Kelway Bamber, London manager of the Leeds Forge Co., Ltd., and late Carriage and Wagon Superintendent of the East Indian Railway, told an amusing story regarding the hasty construction of the Royal train used by the King and Queen, when Prince and Princess of Wales, during their visit to India. The train, which was the work of native labour, said Mr. Bamber, had not been completed when it was required to start on a forty-eight hours' journey to the spot where Lord Curzon, at that time Viceroy, was to enter it. Mr. Bamber, however, gave orders that it must leave at once, and in order that it might be completed in the time, 500 workmen were put into it, to finish the work on the way. They were working right up to the last moment, until information was received that Lord Curzon's carriage was coming round the corner. The workmen then hid behind the station walls, and Lord Curzon entered the train, quite unaware that it had only been completed a few moments before.

* * *

OFFICERS and employés of the Grand Trunk Railway system are about to send another contribution amounting to over $20,000 to the Canadian Patriotic Fund, representing one day's pay voluntarily given from wages for the month of May. Up to January 1st, 1916, the Grand Trunk employés had contributed $135,000 to the Patriotic Fund, and they have decided this year to give one day's pay each quarter towards this national work. With over 3,000 men from the system fighting at the front,

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the Company has paid from the beginning of the war nearly one million dollars in war pay to its employés and kindred charges. In place of the six months' pay previously given to each Grand Trunk man enlisting, the Grand Trunk Railway is now giving $10,000 each month to the Patriotic Fund, this being in addition to the amounts contributed by its men.

* * *

DURING last winter, in addition to the usual overhaul, a number of important improvements were made in the steamships *Keewatin* and *Assiniboia* of the Canadian Pacific Railway's Great Lakes fleet. The most important of these is an extension of the upper and promenade decks right to the stern, which provides, abaft the verandah café, a roomy, covered-in and sheltered space, which will be ideal for evening dances. Immediately above, the promenade deck has been extended, giving a clear space of 50 feet by 36, which, without interfering with the promenade, gives a splendid opportunity for quoits, shuffle-deck, and other shipboard games. The dining-saloons have been entirely remodelled and are now fitted with a number of small tables accommodating parties of from two to six people. With these new windows, from any seat in the saloon, the diner can see out easily and enjoy the changing panorama of lake scenery. To meet the growing demand of the travelling public for something a little out of the ordinary, in addition to the cabins-de-luxe or parlour-rooms, which have been so popular in the past, several rooms have been fitted with connecting shower-baths.

* * *

BY the construction of a short line of rail to an extensive deposit of kaolin near Huberdeau, in Quebec, the ousting of German and Austrian porcelain wares from the Canadian market has been brought appreciably closer. The deposit has been rendered accessible by the building of a spur line of the Canadian Northern Railway from its Montfort branch.

* * *

NEW appointments by the Canadian Government include Sir John Eaton, Toronto, Mr. Huntley Drummond, Montreal, and Mr. W. J. Christie, Winnipeg, as Government directors of the Canadian Northern Railway, and Mr. J. L. Englehart, chairman of the Temiskaming and Northern Ontario Railway, and Mr. H. Laporte, Montreal, as Grand Trunk Pacific directors.

* * *

IT is a compliment to France that the junction point of the Kettle Valley Railway with the main line of the Canadian Pacific Railway near the station of Hope, on the north side of the Fraser River, has been named Petain, in honour of the famous French general in command at Verdun.

# Railway Literature.

THE STORY OF THE CANADIAN PACIFIC RAILWAY. By Keith Morris. [William Stevens, Ltd. Price 3s. 6d. net.] Appropriately introduced by a recent portrait of Lord Shaughnessy, Chairman and President of the Canadian Pacific Railway, the author tells, in what appear to be a series of essays rather than chapters, the main facts concerning the development of this great Dominion undertaking. The first section is entitled "Pathfinders," and deals with the pioneer work of Sandford Fleming, and the difficulty of locating suitable routes through the mountains. The next division deals with the "Pathmakers," and reviews the arduous work of construction, this leading to section III., entitled "Craigellachie," where, on November 7th, 1885, in the Eagle Pass, the rails from the Atlantic first met those from the Pacific. Many well-known names appear, Donald Smith, Lord Mount Stephen, Sir William Van Horne, Lord Strathcona, Sandford Fleming, and others, their respective parts in the entrancing record being duly set forth. Other sections are entitled "The Saving of British Columbia," "The Highway to Asia," "Superstructure," and "The Making of a Nation," while a lengthy appendix tells the story of Canadian Pacific Finance in figures. Within 154 pages a great deal of interesting and instructive information is set forth, though the author has set out rather to tell the story of the Canadian Pacific Railway for general reading than from the strictly historic point of view. Sixteen portraits and illustrations are included.

* * *

NORTH EASTERN RAILWAY "DIRECTORY OF MANUFACTURERS." The favour with which previous issues of the Directory of Manufacturers, etc., has been received, has led the Commercial Agent of the North Eastern Railway to issue a third edition. The Directory contains over 36,000 entries, classified under more than 1,200 separate trade headings, to which there is a special index. There is also a list of registered telegraphic addresses in addition to amplified telephonic information. Another feature of the new issue is a map of the North Eastern Railway system, showing in distinctive colours the principal natural products of the districts served, also at a glance the wide range of Continental and "Overseas" Sailings which in normal times are maintained from the North East Coast Ports. Fifteen thousand copies have been prepared for gratuitous distribution to traders throughout the country, His Majesty's Consuls all over the world, to British, Colonial and Foreign Chambers of Commerce, etc.

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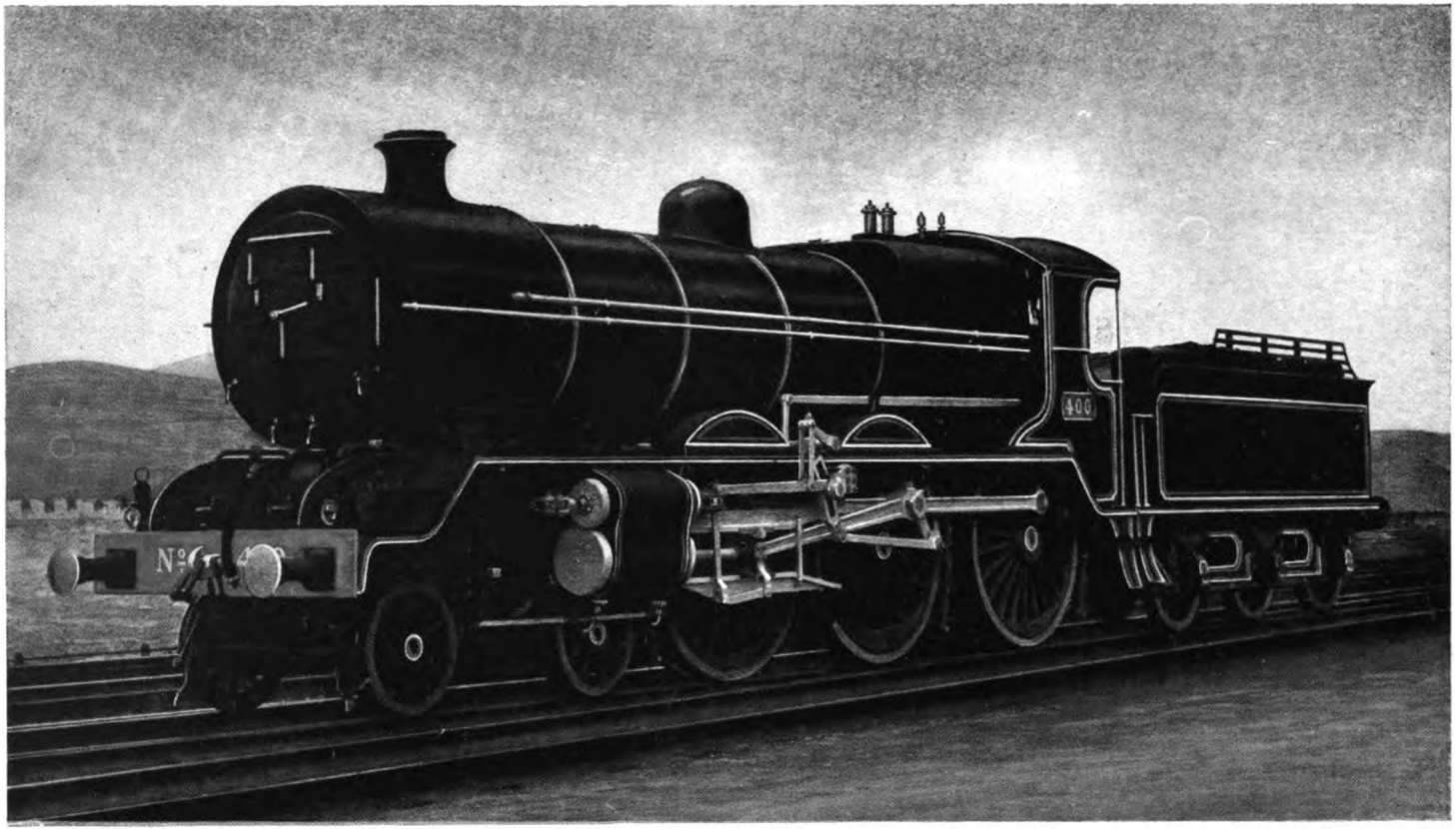


## 4—6—0 FOUR-CYLINDER SUPERHEATER EXPRESS LOCOMOTIVE No. 400: GREAT SOUTHERN AND WESTERN RAILWAY, IRELAND.

Designed by Mr. E. A. Watson, Locomotive Engineer, and built at Inchicore Works, Dublin.

Cylinders (4), 14 in. by 26 in.; coupled wheels, 6 ft. 7 in. diam.; steam pressure, 175 lbs. per sq. in.; heating surface, tubes, 1,614 sq. ft.; firebox, 158 sq. ft.; superheater (Schmidt), 440 sq. ft.; total, 2,212 sq. ft.; grate area, 28 sq. ft.
Weight of engine in working order, 70 tons 14 cwt.; with tender, 108 tons.

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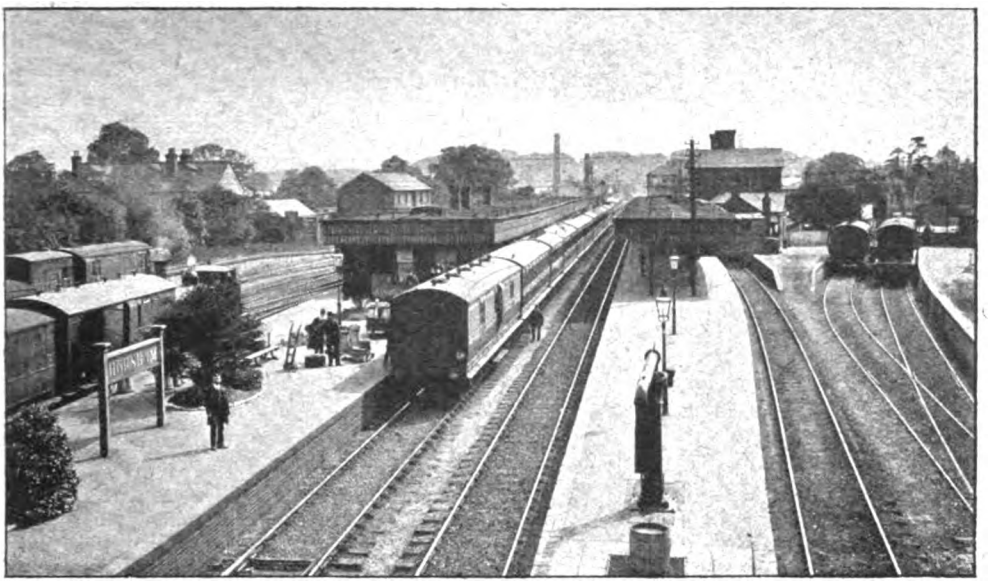

HORSHAM STATION, WHERE FIVE TRAFFIC ROUTES CONVERGE.

# The Portsmouth Routes of the London, Brighton and South Coast Railway.

By J. F. GAIRNS.

DUE possibly to the fact that the construction of the Brighton and Shoreham Railway coincided with the making of the London and Brighton line—opening actually preceded the completion of through rail communication between the Metropolis and the successor to ancient Brighthelmstone—extensions were early undertaken westwards of the Metropolis of the South Coast, so that by June 14th, 1847, within less than seven years of the opening of the London–Brighton line throughout (September 21st, 1841), a T-shaped system had been constituted, the eastern lines running from Brighton to Hastings, 34½ miles, and the western sections extending right through to Portsmouth (44½ miles). This, with the 50¼ miles of the original main line, gave a very presentable mileage for a railway not built to connect great trading and industrial centres many miles apart, and virtually completed the nucleus of the "Brighton" system. For some time, indeed, it was mainly the London suburban lines which received attention, and sundry branch lines; and it was not until the 'sixties that a "new and shorter route" to the great Naval centre began to take shape, mainly as a result of the construction of various branches and the possibilities of linking up which began to offer themselves in due course.

But before dealing with those it will be useful to set forth the stages by which the original Portsmouth main line was built up, as follows:—

| | Opened. | M. | Ch. |
|---|---|---|---|
| Brighton to Shoreham .. | May 12th, 1840 | 5 | 71 |
| Shoreham to Worthing .. | Nov. 24th, 1845 | 4 | 56 |
| Worthing to Arundel (Ford Junct.) | Mar. 16th, 1846 | 9 | 7 |
| Arundel (Ford Junct.) to Chichester .. .. | June 8th, 1846 | 8 | 74 |
| Chichester to Havant .. | Mar. 15th, 1847 | 8 | 76 |
| Havant to Portsmouth .. | June 14th, 1847 | 7 | 18 |
| | | 44 | 62 |

In regard to sections which afterwards became included in London–Portsmouth routes, the Croydon–Epsom line had been opened, May 10th, 1847, and the branch from Three Bridges to Horsham (8 miles 35 chains) on February 14th, 1848, but it was not until ten years later that any more extended system in the western district began to take shape.

The Epsom line was first extended to Leatherhead, and meanwhile a line had been



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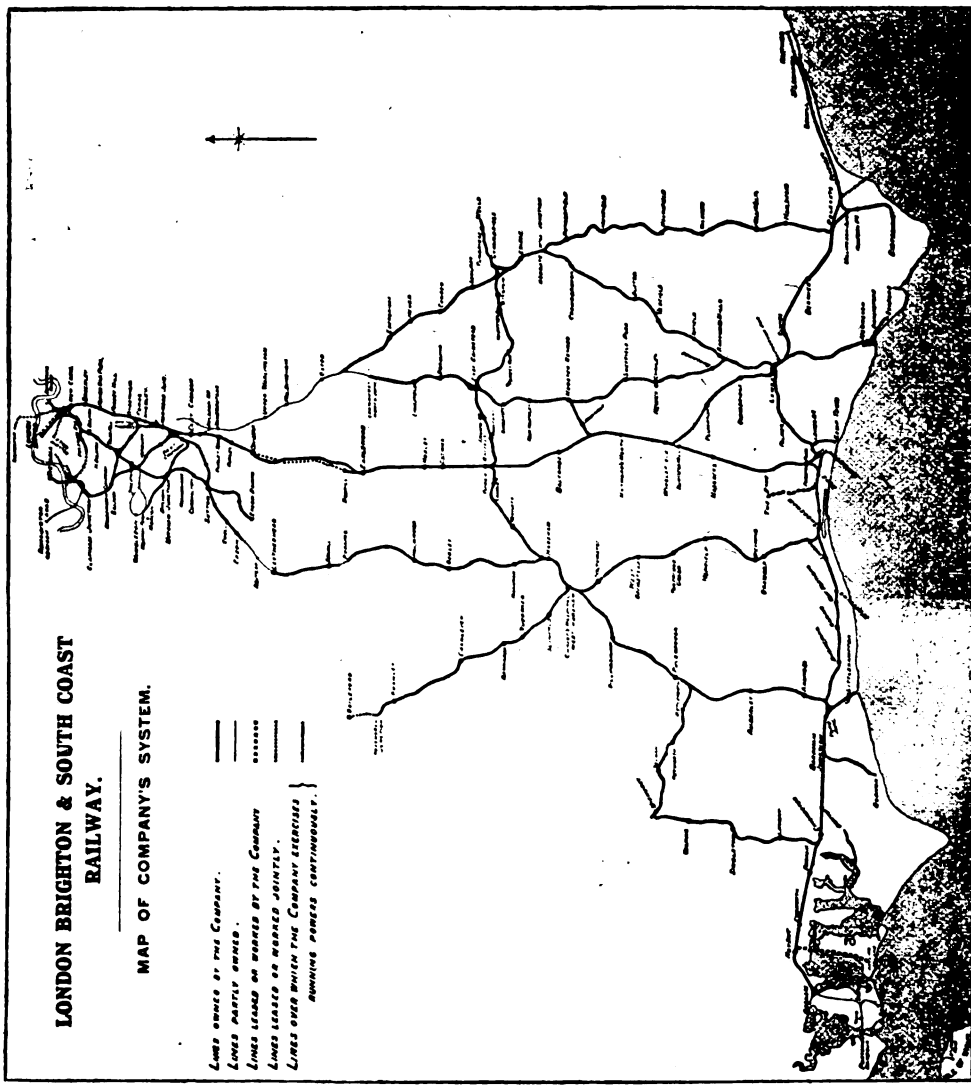
taken in hand from Horsham to Petworth, on what is now one of the Midhurst branches. Similarly, the Steyning and Henfield line from Shoreham had been extending towards Horsham, and this was completed throughout on September 16th, 1861, joining the Horsham–Petworth line at Itchingfield Junction, near where Christ's Hospital station is now located.

diverging from the Brighton main line at Three Bridges and constituted as follows :—

| | Opened. | M. | Ch. |
|---|---|---|---|
| Three Bridges to Horsham | Feb. 14th, 1848 | 8 | 35 |
| Horsham to Hardham Junction .. .. | Oct. 15th, 1859 | 13 | 11 |
| (Horsham to Petworth 17 miles 41 chains) | | | |
| Hardham Junction to Ford Junction .. .. | Aug. 3rd, 1863 | 9 | 61 |


LONDON BRIGHTON & SOUTH COAST RAILWAY.
MAP OF COMPANY'S SYSTEM.
LINES OWNED BY THE COMPANY.
LINES PARTLY OWNED.
LINES LEASED OR WORKED BY THE COMPANY
LINES LEASED OR WORKED JOINTLY.
LINES OVER WHICH THE COMPANY EXERCISE RUNNING POWERS CONTINUOUSLY.

The next step was the construction of the 9 miles 39 chains from Hardham Junction (where the Midhurst trains from Pulborough now diverge) to Ford Junction, which gave its original name to the new station built closer to Arundel village and castle. This completed a second route to Portsmouth,

As thus constituted, the 94½ miles' route from London to Portsmouth *viâ* Brighton was then replaced by one of 86 miles *viâ* Three Bridges and Horsham. This route is still adopted for some of the express trains, as there is not much difference as compared with the distance *viâ* Sutton and Dorking.

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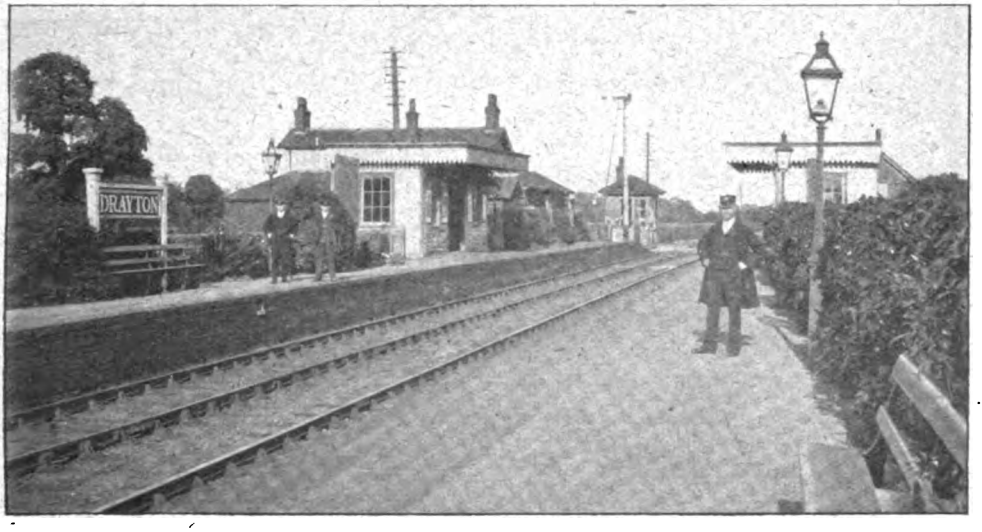
Probably a principal reason for adopting the rather harder route now favoured for most trains is that they are kept away from the main line through East Croydon, that section being further complicated by the fact that both South Eastern and Brighton trains had to use the busy Croydon–Redhill portion.

In conjunction with the lines so far reviewed, it will be sufficient to mention the dates of opening of certain other sections, as follows :—

| | Opened. | M. | Ch. |
|---|---|---|---|
| Shoreham to Partridge Green .. .. | July 1st, 1861 | 10 | 27 |
| Partridge Green to Itchingfield Junction .. | Sept. 16th, 1861 | 6 | 77 |
| Petworth to Midhurst .. | Oct. 15th, 1866 | 5 | 69 |




DRAYTON STATION.

| | | | |
|---|---|---|---|
| Midhurst (L.B. & S.C.) to S.W. station .. | Oct. 15th, 1866 | 0 | 28 |
| Littlehampton Branch .. | Aug. 17th, 1863 | 2 | 0 |
| Guildford Branch .. | Oct. 2nd, 1865 | 17 | 27 |
| Barnham Junction to Bognor .. .. | Oct. 1st, 1864 | 3 | 47 |

The Sutton and Dorking line now calls for attention. Leatherhead had been reached on August 8th, 1859, but it was not until 1867 that the connection was completed, the stages being :—

| | Opened. | M. | Ch. |
|---|---|---|---|
| Croydon to Epsom Town | May 10th, 1847 | 7 | 74 |
| Epsom to Leatherhead .. | Aug. 8th, 1859 | 4 | 14 |
| Leatherhead (old to new station) .. .. | Dec. 23rd, 1866 | 0 | 35 |
| Leatherhead to Dorking.. | Mar. 11th, 1867 | 4 | 5 |
| Dorking to Horsham .. | May 1st, 1867 | 13 | 39 |

This completed a third route from London to Portsmouth, though *viâ* West Croydon to Sutton. There still remained the direct line from Balham to Sutton, crossing at Mitcham Junction the West Croydon–Wimbledon line, opened October 22nd, 1855, together with the connections with the South London line whereby services *viâ* Mitcham Junction are given with London Bridge.

The South London line had been opened from London Bridge to Brixton on August 13th, 1866, and the line across from Peckham Rye to Sutton was brought into use on October 1st, 1868. Connection was given from the Victoria route *viâ* what is now the main line junction, the big girder bridge from the local side being of much later date.

Thus were set up the whole of the routes between London and Portsmouth now available, all of which are still used, except that it is but rarely that London trains work through *viâ* Brighton except to Littlehampton and Bognor. The other routes are all employed : (1) direct from Victoria *viâ* Mitcham Junction to Sutton and thence *viâ* Dorking and Horsham ; (2) from London Bridge *viâ* Peckham Rye and Mitcham Junction to Sutton ; (3) from Victoria *viâ* West Croydon to Sutton ; (4) from London Bridge *viâ* West Croydon to Sutton ; and (5) from Victoria or London Bridge *viâ* East Croydon to Three Bridges and Horsham. These also provide a possible alternative route to Brighton *viâ* Horsham, Partridge Green and Shoreham, this being double track throughout, though the services north and south of Horsham are usually treated as

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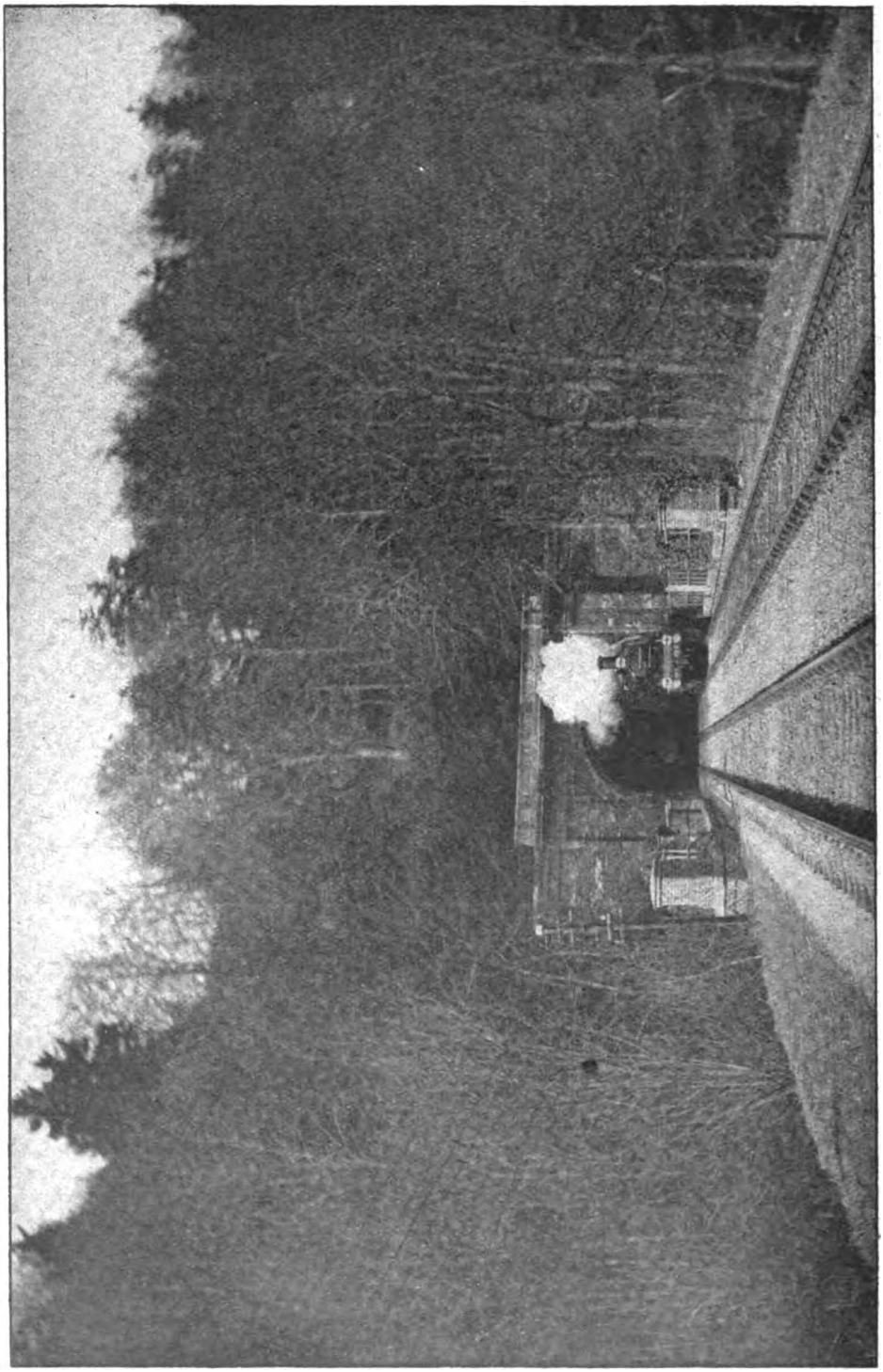

A PICTURESQUE VIEW OF MICKLEHAM TUNNEL (SOUTH END).

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distinct. The Midhurst routes also provide an alternative from Pulborough to Chichester, but this is only suitable for local purposes.

It is necessary to mention that the Hayling Island Railway, at first worked by the contractor but soon after leased by the London, Brighton and South Coast Railway, was opened for traffic, January 1st, 1872. The Portsmouth Harbour extension had been made from the Town station in 1876 (opened October 22nd); the Chichester–Midhurst line was brought into use July 11th, 1881; the Fratton–Southsea line July 1st, 1885; and the Littlehampton direct line June 1st, 1887.

So far all the lines referred to have been treated as belonging to the Brighton Company, but this is not quite correct, seeing that from Portcreek, near Cosham, to Portsmouth was early made joint with the London and South Western Railway, as is also the section between Epsom (S.W. station) and the connection to the London and South Western Railway station at Leatherhead, while the Fratton and East Southsea line was a joint undertaking.

These joint arrangements possess some interest, and as there were certain adventurous features, the main facts of the story, though it is now a well-worn one, may be briefly recapitulated. Soon after the line to Portsmouth had been opened, a dispute arose between the two companies as to the working of the joint section, and one result of certain retaliatory measures was the promotion of the line from Wimbledon to Croydon by the London and South Western Railway. This was, however, constructed as a joint undertaking, and soon after it was opened (in 1855) this section was leased by the Brighton Company, who eventually took it over altogether in 1866.

Further difficulties then arose in the Portsmouth district, owing to the promotion by a separate company of what is now the Petersfield route of the London and South Western Railway to Portsmouth; and as this company was not included in the joint arrangements, an independent line was proposed from Havant to Portcreek (where the London and South Western Railway now joins), with running powers onwards. Use of the joint station at Portsmouth was, however, to be only by consent of the London, Brighton and South Coast and London and South Western Companies, and so an independent terminus was projected at Landport.

This company was leased to the London and South Western Railway in 1858; but apparently the arrangements proposed did not meet with the approval of the Brighton Company, and so, as the story runs, an attempt was made to catch the Brighton people napping, only to find the approach of the first train to Havant stopped by removed rails at the junction and an engine chained to the crossing. There was something of a scrimmage, but one difficulty removed only cleared the way to another, and finally the London and South Western train had to retire, while the engine of a Brighton train returned to London "profusely decorated with rosettes." However, a settlement was arrived at in the Law Courts, and on January 24th, 1859, London and South Western trains began to run through to Portsmouth *viâ* Petersfield and Havant, as well as *viâ* Fareham and Cosham.

One other historical matter must be referred to. In 1880 the Brighton and South Western Companies took over the steamers running between Portsmouth and the Isle of Wight at Ryde, incidentally improving the service, and at the same time undertaking the rebuilding of Ryde Pier (opened July 12th, 1880), and constructing a double line of railway upon it. This section extends nearly to St. John's Road station, Ryde, but is necessarily worked by the Isle of Wight and Isle of Wight Central Railways.

Last month, in an article entitled "The Sunshine Line," reference was made to the almost universal "picturesqueness" of the Brighton system, and this feature is strongly in evidence on the direct Portsmouth routes and the branches associated therewith. As generally follows, the most picturesque portions are those which are most difficult to work in view of grades and curves, so that the direct route through Sutton, Dorking, Horsham and Pulborough is far from easy, at least as far as Arundel, after which fairly flat country is traversed.

Leaving the Victoria main line the first feature of interest is the series of junctions near Streatham Common. Express trains from Victoria diverge directly, though on a sharp curve and fairly steep grade, but from the local lines a distinct junction is provided, crossing the main lines by a remarkable bow-string girder bridge built on the skew. London Bridge trains strike across from Peckham Rye *viâ* the picturesque North Dulwich line to Tulse Hill and Streatham, and then cross the Victoria main

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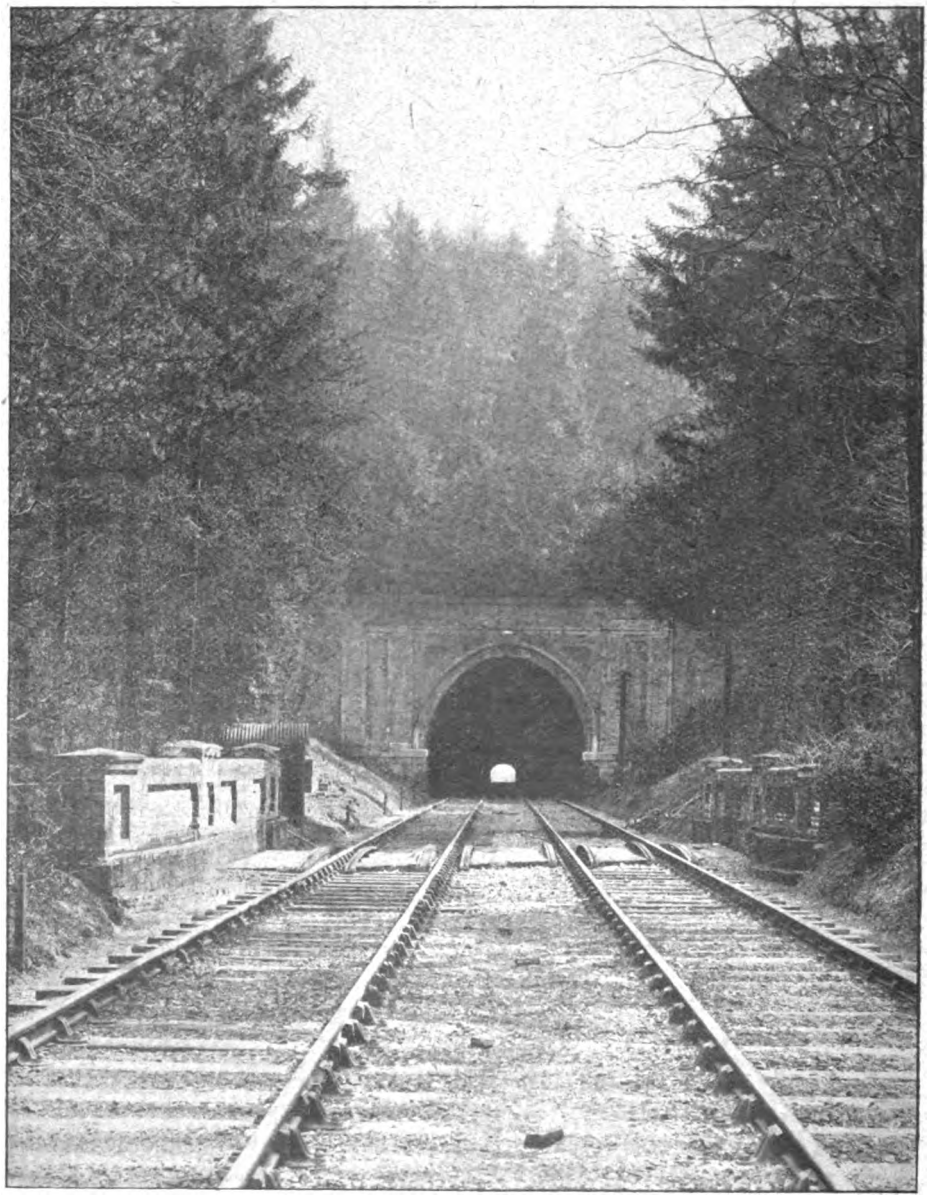
lines by a separate bridge, joining the two routes from Victoria just beyond, and at almost the same point putting off the Wimbledon branches. There is, in fact, a quadruple junction here available in all directions, and under the control of one signal cabin.

A little way beyond are extensive carriage sidings. A smart run through relatively open country and Mitcham Junction is reached, involving a severe speed reduction for the curves as the line from Wimbledon comes in at the north end, and the Croydon line leaves at the south end.



MICKLEHAM TUNNEL (NORTH END.)

The pretty suburbs of Hackbridge and Carshalton are passed by express trains at speed, and then, with another sharp curve, the combining station at Sutton is reached.

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Victoria and London Bridge portions of many trains are joined here, dividing on return. Sometimes the main line engine works from London Bridge, but usually from Victoria. Where through portions are not provided from or to both termini, direct connections are usually available, and occasionally the London Bridge service is given *viâ* West Croydon. In other cases the London Bridge portion sometimes calls at Mitcham Junction; and there may be other calls in the suburban area for trains which do not rank as Portsmouth "fasts" or expresses. The branch platforms at Sutton leading to Epsom Downs are useful for combining main line trains, or this is done by using the relief lines now available from Sutton to Cheam.

Interesting widening works have been undertaken during the last two or three years from Sutton to Cheam, the latter station having become a new suburban terminus, relieving Sutton of reversing duties for local trains, and incidentally providing increased facilities for the growing residential area adjacent to Cheam station. There are now four lines between these two stations, and at Cheam new platforms have been built for the outside lines, while the fast tracks in the centre are widely spaced so that a middle platform can be added when required.

By this time the scenic beauty of the route is beginning to disclose itself fully, and through Ewell, Epsom, Ashtead and Leatherhead the country traversed is exceptionally pretty, with the luxuriant foliage characteristic of the district, and the heights of the North Downs opening out in the distance.

Epsom involves a severe slack, for the Brighton station entails one curve, while the connection with the London and South Western Railway requires another in the reverse direction. The arrangement is somewhat peculiar, as all Brighton trains run through the middle of the South Western station the tracks and platforms for which are outside, no connections between lines being made at the north end of the station though down South Western trains have to cross both Brighton lines to reach their own down platform.

Beyond the station the ordinary two tracks are used by all trains, and this continues through Ashtead—where the famous Woods are seen not far from the line—to the outskirts of Leatherhead. Here South Western trains diverge to their own picturesque station and *viâ* a curved viaduct away towards Guildford, while Brighton trains continue towards Box Hill station, entering rising ground, with some steep grades, as the Cliff-like sides of Box Hill come into view on the left and Leith Hill reveals itself to the right. Through Box Hill and Dorking, is one of the prettiest portions of the route. Here also curves are involved, and just beyond Dorking station the South Eastern and Chatham Reading line is passed under.

To Horsham, through Holmwood, the terminus of some of the longer journey suburban trains, is a long and good run, though with some hard grades. Horsham is the centre of this portion of the system, and here five traffic routes converge. From the north the Dorking and Three Bridges routes run directly into the station. Southwards, however, the first actual divergence is at the new station built when the new Blue-Coat school was erected, and known as "Christ's Hospital and West Horsham." Here the Guildford branch diverges over a sharp curve, these trains having a separate island platform for their use. The main station has an outer down platform of considerable width and well sheltered, in view of the necessity at times for dealing with large numbers of boys and girls arriving at or leaving the adjacent schools, whose buildings are seen to the left of the line just beyond the station. There is also a down island platform serving both the outer line, which forms a down loop, and the through down line. A further platform serves for up trains. This station is a neat erection, and harmonises with the red brick of the adjacent school buildings. Both main line and Steyning line trains use this portion of the station, the latter diverging at Itchingfield Junction, about a mile further on.

Through Billingshurst some good running is made by express trains, though the grades are far from easy in places; and at Pulborough connection is made with branch trains from Midhurst. In several instances these work through from Horsham, and a local connection is given from Pulborough to Arundel and Littlehampton or Bognor. Midhurst trains actually diverge at Hardham Junction, about a mile from Pulborough. Through Amberley rising ground is again encountered, and there is a large lime works and chalk quarry close to the station. Approaching Arundel one has a magnificent view of the famous Castle, as the line sweeps round about a mile

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CHICHESTER STATION.

away, this section and the curve towards Arundel Junction (where the original Brighton line joins and the direct Littlehampton branch diverges) revealing nearly three sides of the castle buildings, with the picturesque heights adjoining.

Along this section, too, the River Arun, beloved of anglers and noted for its scenic beauty, in many places keeps company with the railway. Near Pulborough it is crossed, and close alongside the railway bridge may be seen the picturesque and ancient three-arched road bridge over the river. Near Hardham Junction may be seen Hardham Priory. Alongside the line is a portion of the Arun Canal, and from the point where this joins the river all the way to Amberley, the river is in close association with the railway, first on the left, going down, past "Amberley Wild Brooks" and then on the right. At Amberley station the river is alongside the line, and with loops of the river, it is a close neighbour onwards to Arundel, with no fewer than four bridges over watercourses or the river. Near Arundel the Arun diverges to the vicinity of the Castle, by which time it has become a navigable commercial stream as well as a pleasure and boating resort. Near Ford Junction the river is finally crossed by the railway, the bridge having a removable span to enable fairly large vessels to proceed inland to Arundel.

The railway junctions at and near Ford are of interest. The Arundel and Brighton lines join at Arundel Junction, and immediately put off the new direct line to Littlehampton. The loop from the Littlehampton branch to Ford Junction completes the third side of a triangle, while an embankment may be noted which constituted the original branch route before the alterations introduced a new location. There is a frequent local train service between Arundel and Littlehampton, made up of short trains or rail motors running direct, usually in connection with main line trains or sometimes constituting portions thereof, and further connections or portions *viâ* Ford Junction.

Extending across from the Arun to the Chichester Channel is the Chichester and Arundel Canal, now disused, and this is crossed by the Bognor branch and by the Hundred of Manhood and Selsey Tramways from Chichester to Selsey. From Barnham Junction is put off the Bognor branch. Soon after passing Drayton station the graceful spire of Chichester Cathedral, with the Bell Tower alongside, comes into view.

Chichester is a most interesting old-world town, with its North, South, East and West

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Streets, all converging upon the famous Market Cross; the remains of the old city walls, a portion of which is laid out as a public promenade; and the cathedral itself, and associated buildings.

The station lies on the south side of the town, and a few yards below is the depôt of the Selsey Tramways, to which reference is made on another page. Chichester is an important traffic centre, and there are extensive goods and cattle sidings. Both passenger platforms have terminal bay lines, that on the up side serving for local trains from Midhurst *viâ* Lavant, the other serving for local and motor trains working between Chichester and Portsmouth.

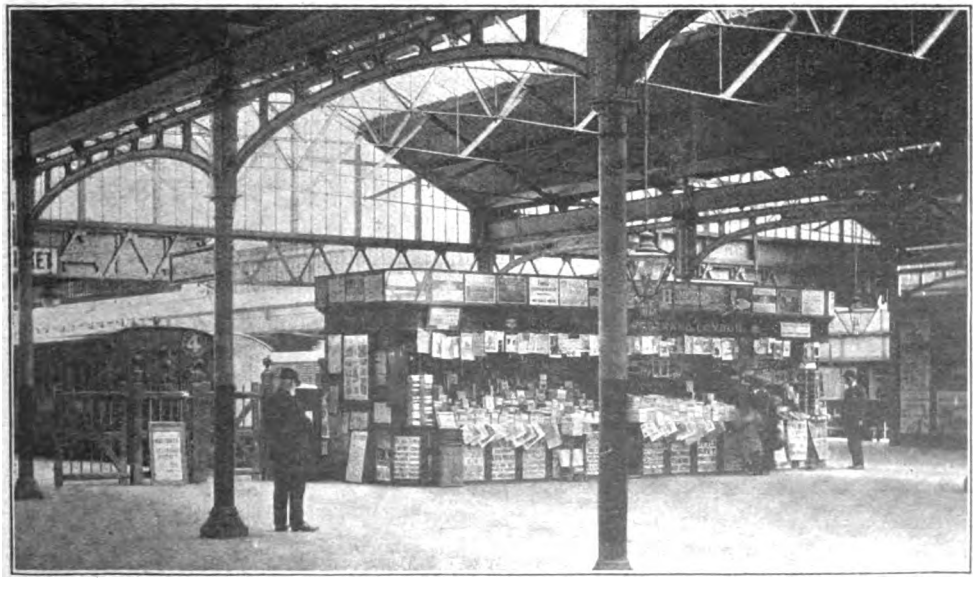
Country traversed is now flat in character, and good running is made by fast trains, past old-world Bosham and Emsworth (a lifting bridge is provided here for crossing the River Ems), with halts at Fishbourne, Nutbourne, Southbourne and Warblington on the way to Havant.

Near Havant the London and South Western line *viâ* Petersfield already referred to, comes in, though we are still on exclusively Brighton territory. The station at Havant is an up-to-date erection, with refreshment rooms and other accommodation. A bay on the down side receives the train working the Hayling Island Railway.

Onwards to Fratton indications are given of the adjacency of Langstone Harbour, and that busy Portsmouth is being approached. A halt is provided at Bedhampton, and at Farlington, by the triangular connection with the London and South Western Railway towards Cosham, is the well-known race-course station. Two sides of the triangle are Brighton property; the third side, and the line as far as Cosham is joint. There is a limited passenger service between Havant and Cosham worked by a London and South Western motor-train, but that place is, of course, mainly served, as regards passenger traffic, by South Western standard trains.

From Portcreek through Portsea Island is joint Brighton and South Western, and this applies to the modern low-level terminal portion of Portsmouth Town station, as well as the high-level platform used by trains working through to the Harbour station. In the Town station there are five platforms, and the wide circulating area is provided with refreshment rooms and other accommodation. Approaches to the high-level station are somewhat inconvenient, but as the platform extends on to the bridge over the Commercial Road, it is difficult to improve the location.

The passenger lines are continued, crossing a part of the pretty Victoria Park, to the Harbour station (5 platforms), where passengers can proceed direct to the pier for the Isle of Wight steamers, or to ferry steamers



INTERIOR OF PORTSMOUTH TOWN STATION.

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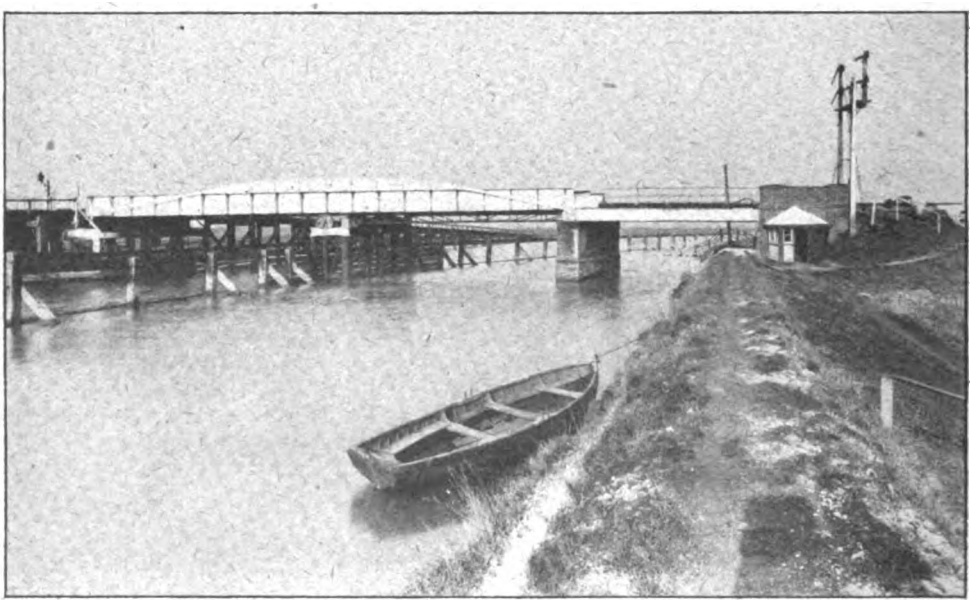
plying to and from Gosport, across the Harbour and past the old *Victory*. The Town station is immediately alongside the beautiful Town Hall which is Portsmouth's pride, and electric tram cars run thence in all directions, including Southsea, Clarence Pier and the district served by the branch line from Fratton to East Southsea, on which passenger trains are not at present running owing to the exigencies of the war.

A few remarks are necessary in reference to other sections concerned. The original route from Brighton is of interest at Shoreham because of the long viaduct over the bed of the river, with the Norfolk suspension bridge for road traffic near by and the old trestle bridge higher up the river. The curious ridge of sand thrown up along the beach, and upon which are erected the famous railway carriage bungalows which constitute "Bungalow Town," extends from Shoreham to Lancing. The bungalows can be reached either from Shoreham or Lancing stations, or from a halt between, served by motor trains, and known as "Bungalow Town Halt." The branch from Horsham *viâ* Partridge Green approaches Shoreham alongside the wide stretch of marshy land at the mouth of the river, giving a fine view of Lancing College on the way. The carriage and wagon works of the London, Brighton and South Coast Railway under the direction of Mr. A. H. Panter, are passed just beyond Lancing station.

Worthing needs no introduction as a coast resort. The station is some distance from the waterside, but the road thither constitutes a very picturesque route. "Sunny Worthing" seldom belies its name, and its beautiful stretch of soft sand, breaking the continuity of the somewhat pebbly beach met with along other portions of the south coast, is highly esteemed by the younger generation. The station at Worthing is one of the prettiest on the London, Brighton and South Coast Railway, which is saying a good deal in view of the high standard of station architecture maintained nearly everywhere on the system. It is a fairly recent erection, with an island on the up side, and on the down platform a long covered verandah, decorated with hanging flower baskets, and with refreshment and dining rooms and station offices on a complete and essentially modern scale. The booking hall is also a nice one, while the façade of the buildings, including parcel, luggage and mail offices adjoining is imposing.



DRAWBRIDGE OVER THE RIVER ARUN AT FORD JUNCTION.

West Worthing serves an extension of Worthing itself, and is the limit of train services which are not extended right through to the Portsmouth route, or to Littlehampton or Bognor. Angmering and Goring-by-Sea

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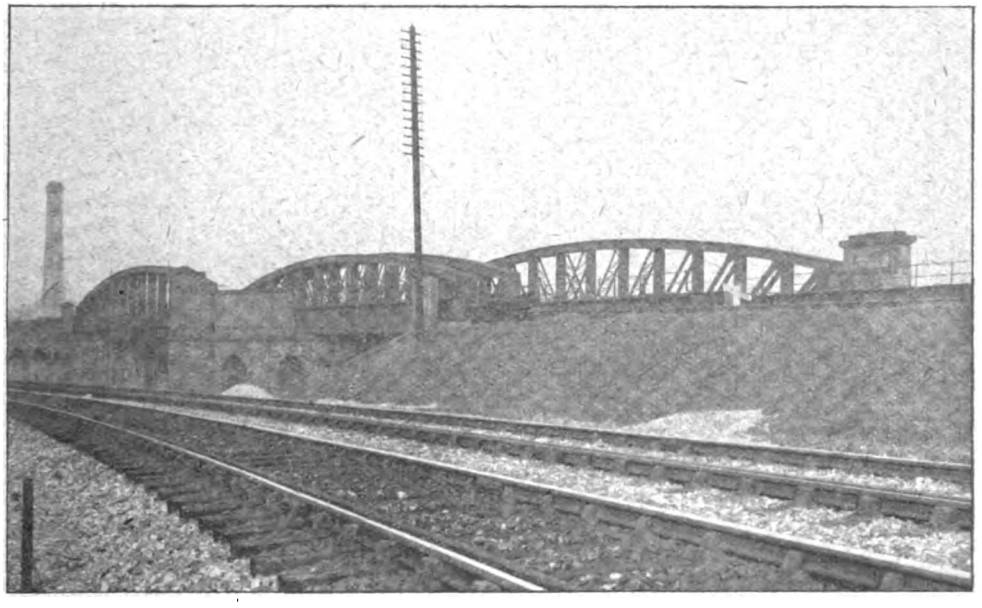
have pretty flower-adorned stations serving resorts which are finding considerable favour with those desiring quiet and picturesque surroundings; also for residential purposes. The whole of this section of the line is generally close to the sea, and lies flat; but is backed by the high ground of the South Downs, so that visitors have the sea and the Downs country conveniently adjacent. At the Arundel Junctions connection is made with what is now the direct route to Portsmouth as already mentioned. The Littlehampton branch is only a short one, but besides serving the growing resort which claims to be "The Children's Paradise," owing to its fine stretch of soft sand, it is also becoming increasingly important as a fishing and shipping port. On one side is the mouth of the River Arun, and this opens out into a harbour where shipping of medium size and of all classes can be seen, while adjacent various industries are carried on. The main frontage is towards the sea, and here there is all that is required to appeal to the little ones on holiday bent, without the artificiality necessarily associated with more ambitious resorts.

The Bognor branch is a longer one, but without intermediate stations, and leads to a resort which bids fair to rival Brighton and Eastbourne. Here again is a fine stretch of clean sand, not too soft, and with pier, kursaal, promenades, boating, fishing and other facilities to meet the ideas of those who like a fair amount of occupation and amusement combined with scenic and natural interest. The station includes an artistic building, with clock-tower, somewhat similar to that at Eastbourne, with courtyard, wide circulating area, and modern appointments, and two double-sided platforms and middle road. The engine shed accommodates two or three main line locomotives, as a Bognor engine works a through train to London, *viâ* Worthing and Hove.



*Photo]* [*G. F. Burtt.*

GIRDER BRIDGES CARRYING THE LOCAL CONNECTIONS TO THE MITCHAM JUNCTION-PORTSMOUTH ROUTE OVER THE VICTORIA-CROYDON MAIN LINES.
Fast line connections in foreground.

The Hayling Island Railway is worked by one of the famous "Terrier" engines, and is characterised by the viaduct across an arm of Langstone Harbour, thence following one coast of the Island from which the line takes its name. The railway is owned by a separate company, but is leased and worked by the London, Brighton and South Coast Railway.

Returning to Horsham, the branch from Itchingfield Junction to Shoreham carries considerable traffic and is double track. It

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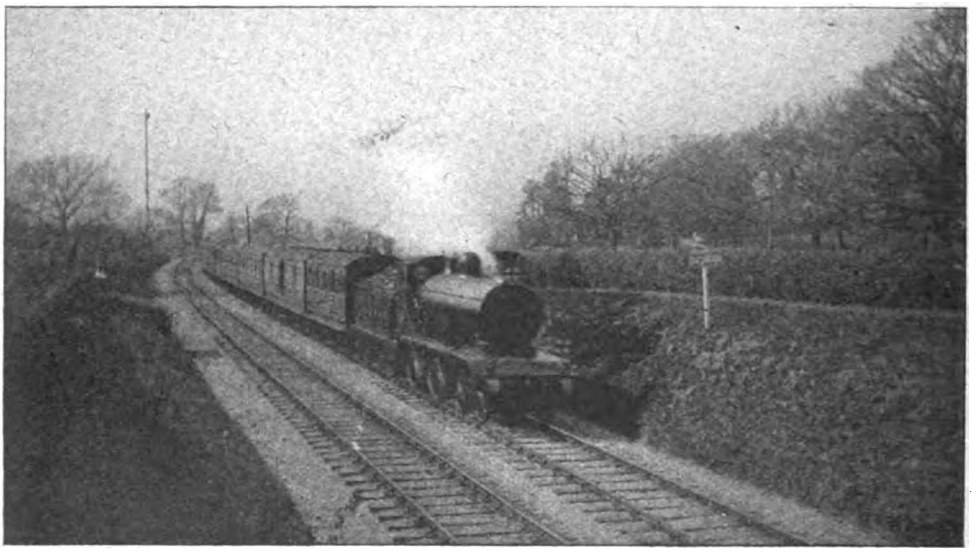
traverses beautiful country as it crosses the South Downs, and many splendid views are unfolded as the traveller proceeds. The Midhurst line from Hardham Junction is single track, and as it follows the course of the River Rother provides another series of magnificent views across the hills and through the woods of this part of Sussex. Usually the trains *viâ* Pulborough terminate at Midhurst, as a lighter load is sufficient for the Chichester route. Midhurst itself is a splendid centre for touring this district. It is also served by the London and South Western Railway whose station is connected with that of the Brighton Company.

But the line from Midhurst to Chichester is, if anything, more beautiful still, and the scenes unfolded constitute a veritable revelation. Here is a single branch line traversing the chalk hills and ridges, fully wooded and providing a constantly changing panorama of natural beauty. There are several fairly lengthy tunnels, but these only close one view of entrancing beauty to reveal another. It is somewhat remarkable, on a single track road like this, and where a two or three coach train usually suffices, to find at Singleton a double island station. This is due, however, to the fact that Goodwood racecourse occasionally provides heavy traffic from Chichester. There is a private line from Lavant station to the Asylum near by.

Several characteristics of all these lines are strongly in evidence almost everywhere. First there is the prevailing picturesqueness referred to, due largely to the continual presence, either near or as background, of the Downs, North or South; the large extent of undulating and high ground; the frequent association of rivers themselves noted for scenic interest; and the luxuriant vegetation found throughout these districts. Secondly, the evidence everywhere, while the country is essentially picturesque, that it is also fully occupied in agricultural and associated industries, of which the large number of level crossings by well-made roads, as well as of occupation crossings, is a further indication. And thirdly, the volume of station to station traffic, and the numbers of passengers entraining or detraining at intermediate stations, showing that many of these places appeal strongly to the holiday-maker, and are themselves centres for groups of prosperous villages.



*Photo]* [*E. S. Hallett.*

PORTSMOUTH-VICTORIA EXPRESS NEAR BILLINGSHURST.
4-4-0 engine No. 65.

Finally, a few remarks in regard to train services. Notwithstanding the undoubted importance of Portsmouth itself, pride of place must be given to those services which have for a main object connections with steamers to and from the Isle of Wight, those *viâ* Portsmouth and Ryde, whether Brighton or South Western, being responsible for the larger proportion of the Island traffic.

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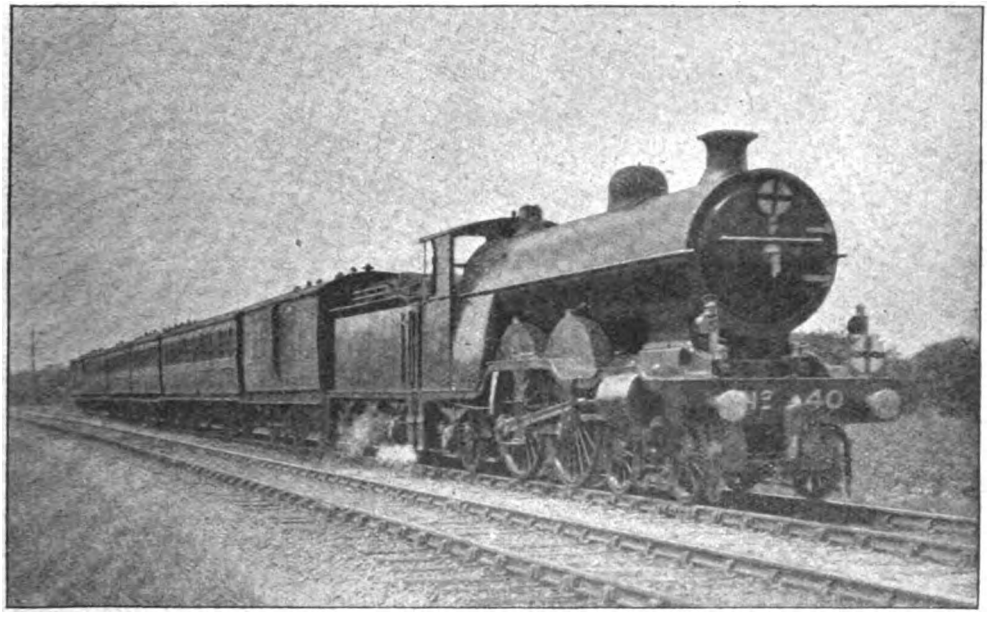
During the war there has been a slight reduction in the number of Island services not, however, due to there being special restrictions, as appears to be a widespread impression, but because the lesser volume of holiday travel has not called for the full facilities of a normal summer. It is true that steamers are not allowed to run to or from Portsmouth Harbour after dark; but that, especially during the operation of the Summer Time Act, is a very insignificant matter; and even when operative the passenger can still cross from Southsea to Ryde, by taking tramcar from Portsmouth Town station. On landing in the Island Furthermore, for the summer period most of the usual Isle of Wight fast trains have been reinstated, giving five express services from London daily, besides others from Brighton. Some of these are combined Victoria and London Bridge trains. The first, at 6.15 a.m. from Victoria and 6.35 a.m. from London Bridge is a fairly slow train; but the 8.55 a.m. from Victoria gives a good service. This calls at East Croydon; and therefore travels *viâ* Three Bridges (not calling) to Horsham and Arundel (for Littlehampton), slips at Barnham Junction for Bognor, and stops at Chichester and Fratton and stations to Portsmouth Harbour.




*Photo]* [*R. W. T. Collins.*

HORSHAM-VICTORIA TRAIN NEAR ASHSTEAD.
4-4-2 engine No. 40.

each passenger has to state his or her nationality, but that is a simple matter, and does not inconvenience anyone not of enemy nationality. Permits are only necessary for visitors of Allied or neutral nationality by routes other than *viâ* Ryde. Otherwise, travel to or from the Island, and within the Isle of Wight, is as free as at mainland resorts, and the only restrictions are those which apply generally.

But although there may not be quite the usual full facilities, there is very little reduction, as shown by the fact that there are no fewer than 17 crossings each way every twenty-four hours, and eight on Sundays.

At 11.35 a.m. from Victoria is a fast train non-stop from Clapham Junction to Fratton, this constituting the principal service of the day. A semi-fast train following at 11.38 a.m. takes up the work which the 11.25 a.m. does during the period when the 11.35 a.m. train is not running. The next service is the 1.35 p.m., from Victoria, non-stop Clapham Junction to Chichester and Havant. During the autumn, winter and spring this train is operated on Saturdays only as a Littlehampton, Bognor and Portsmouth express, the Isle of Wight connections being given off the 1.42 p.m. semi-fast train. The last service is by the

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3.55 p.m. from Victoria, and the faster business express from London Bridge at 4.50 p.m., non-stop to Arundel, with a slip at Barnham Junction for Bognor, and the next calls at Chichester and Havant.

There are, however, several other important services along the Portsmouth route, for Littlehampton and Bognor call for special consideration, while Portsmouth requires many facilities on its account; and in the aggregate there is a very full service on all sections, amplified between Ford Junction and Portsmouth by trains to and from Brighton, and between Chichester and Portsmouth by motor trains serving the halts, and local journeys on various sections. Thus, speaking generally, between Holmwood, the limit of suburban working from London, and Horsham stopping trains are rarely much more than an hour apart, while Horsham itself gets fast as well as slow trains; from Three Bridges to Horsham local trains and rail motors give about an hourly service; from Horsham to Arundel there are seven stopping trains, and several others which call on some stations, besides the fasts; between Arundel, Ford Junction, Littlehampton, Barnham Junction and Bognor, there is quite an elaborate local service; and from Chichester to Portsmouth a fairly full service of trains is provided serving the more important or all stations, with motor trains for the halts.

Among trains which may be noted specially are 10.20 a.m. from Victoria and 10.25 a.m. from London Bridge, calling from Sutton at Horsham, Arundel and Chichester to Havant, with special Littlehampton and Bognor trains from Victoria and London Bridge at 10.30 a.m. These are separate trains throughout, replacing the composite work of the main train which suffices except during the summer months. The London Bridge train at 10.30 a.m. travels *via* West Croydon to Sutton. Then for part of the summer there is a special Bognor train from Victoria at 1.35 p.m., while in August a 1.40 p.m. is run for Littlehampton and Bognor, and on Saturdays in August one at 3.53 p.m. These are all more or less express trains.

Returning, among the special summer facilities may be noted the 12.10 p.m. from Portsmouth Harbour, the 2.0 and 3.55 p.m.

LANGSTON SWING BRIDGE, HAYLING ISLAND RAILWAY.

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fast through trains from Bognor and Littlehampton, one to London Bridge *viâ* Sutton and West Croydon, and the other to Victoria *via* Three Bridges. Also the 7.5 p.m. from Portsmouth Harbour, non-stop from Barnham Junction to Purley, and therefore travelling *viâ* Three Bridges. The 4.45 p.m. from Portsmouth Harbour to Victoria is also reinstated for the summer. From Fratton this calls at Chichester, and Horsham only to Victoria.

Several Bognor services are also given *viâ* Hove and Worthing, slip portions detached at Preston Park from Brighton trains, or through trains running fast to Shoreham and Worthing and continuing through to Bognor, with Littlehampton connections. Certain of the Brighton-Portsmouth services also run through from and to Hastings or Eastbourne, constituting a lengthy coastal service which is very useful for tours along the "Sunny South" Coast.

Characteristic of the Brighton line, many of the local and branch trains make comprehensive journeys from section to section. Thus trains may run from Tunbridge Wells to Three Bridges, thence to Horsham and on to Pulborough, Arundel and Littlehampton or Bognor, or to Midhurst. For many of these services the well-known "D" tanks are used, while others involve the larger 0-4-4 or 0-6-2 tank engines, and occasionally the big 4-4-2 or even 4-6-2 tank engines.

For the through main line trains the "Atlantics," the "Baltic" tanks Nos. 327 and 328, the 4-6-2 tanks Nos. 325 and 326 and the standard 4-4-0 tender and 4-4-2 tank engines are generally employed. A frequent practice for main line engines is, in fact, to work on triangular duties, thus Brighton-London-Portsmouth-Brighton, or London - Brighton - Portsmouth - London, so that engines of all classes are met with.

*Photo]* [*T. B. Welch.*

VICTORIA-PORTSMOUTH EXPRESS.
4-4-2 superheater express tank engine No. 83.

In conclusion, the general high standard of rolling stock used for main line services—elliptical-roofed bogie stock, with a good proportion of lavatory accommodation—and the large number of stations where refreshments may be had, may be commented upon.

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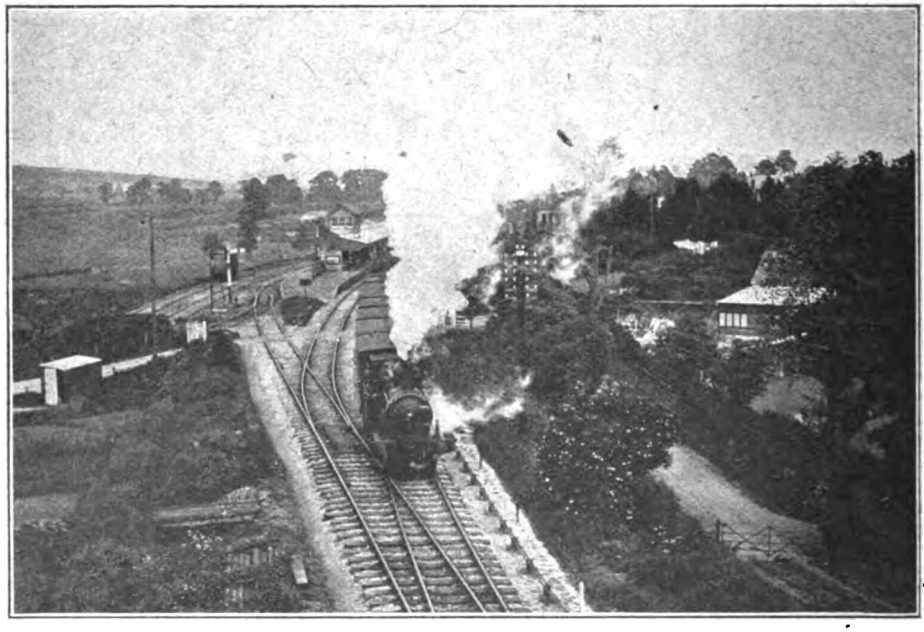
# The Garden Isle.

"*Of all the Southern Isles she holds the highest place.*"—MICHAEL DRAYTON.

WHAT the Isle of Man is to Lancashire and Cheshire, so in a quieter and less obtrusive mannér is "The Garden Isle" of Wight to the south-countryman and the Londoner, with not a few visitors from further afield. It is, indeed, in many respects an ideal touring ground, for while some resorts are bracing, others are relaxing, there is choice of beautiful sandy beach, of cliff-lined coast, and of high ground or picturesque glen and valley, all varieties being within the scope of holiday season tickets whereby each place of interest can be visited conveniently and at low cost.



TRAIN LEAVING SANDOWN STATION.
Isle of Wight Central Railway trains use the platform to the left.

In introduction it must be emphasised that the Portsmouth-Ryde route is not a preserve of the London, Brighton and South Coast Railway, though the article on other pages deals only with the "Brighton" Company's lines between London and Portsmouth, but is also provided for by the London and South Western Railway, the steamers also being jointly owned. An extensive traffic is further carried *viâ* Southampton and Cowes, and a considerable number of passengers travel *viâ* Lymington and Yarmouth. These are purely London and South Western services and, together with the various routes from Waterloo to Portsmouth, and the cross-country trains from Cardiff, Bristol and other places away from London, must be reserved for detailed consideration on another occasion.

The Isle of Wight is well supplied with railways, in proportion to its area, and three working companies are now concerned. These lines all come within the terms of the control of railways by the Government. The Isle of Wight Railway, of which Mr. H. K. Day has been General Manager for many years, is the shorter of the two larger systems, but obtains a considerable proportion of the through traffic from London to holiday resorts, seeing that its trains run direct from Ryde to Sandown, Shanklin and Ventnor, and over the branch from Brading to Bembridge. The Isle of Wight Central Railway, whose fortunes have been directed by Mr. Russell Willmott for several years, during which important progress has been made, has the more comprehensive system, there being four radiating routes from Newport, the capital of the Island, respectively to Cowes (where connection is made with steamers on the Cowes-Southampton service,



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also from Portsmouth *viâ* Ryde); to Sandown, with a branch to Ventnor; and to Ryde, where also connection is made with the steamers to and from Portsmouth and Southsea. The Freshwater Railway, under the direction of Mr. G. M. Button, was for a long period worked by the Isle of Wight Central Railway, but since July, 1913, has been operated independently, though in connection with "Central" trains at Newport.

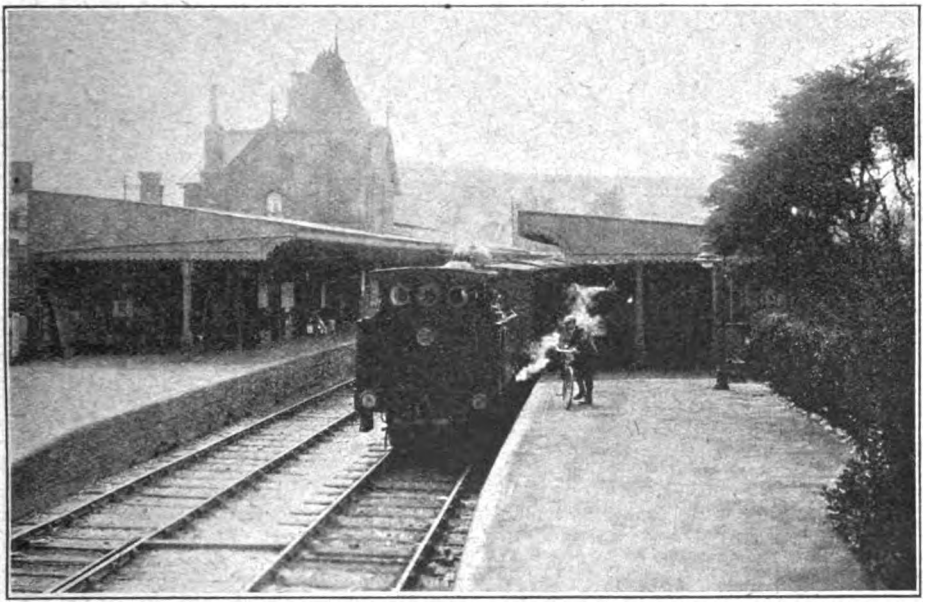
The following statistics may be presented in summary:—

*Isle of Wight Railway.* Opened August 23rd, 1864; length 14¼ miles, including the Bembridge branch; 8 locomotives, 40 passenger vehicles, 16 other passenger train vehicles; 227 goods and service vehicles. Mr. H. K. Day is General Manager and Secretary, with headquarters at Sandown station, and Mr. H. D. Tahourdin is Engineer and Locomotive Superintendent, with works alongside St. John's Road station, Ryde.

*Isle of Wight Central Railway.* Constituted in 1887 by the amalgamation of the Cowes and Newport (incorporated 1859), Isle of Wight (Newport Junction) (incorporated 1868), Ryde and Newport (incorporated 1872), and Newport, Godshill and St. Lawrence (Merstone to St. Lawrence, opened July 20th, 1897, to Ventnor Town, June 1st, 1900, vested in the Isle of Wight Central Company 1913) Railways. Length 28 miles 47 chains; 11 locomotives; 53 coaching vehicles; and 324 goods, mineral and service vehicles. Mr. Russell Willmott combines the duties of General Manager, Secretary, Engineer and Locomotive Superintendent, with Mr. G. R. Newcombe as Assistant on the managerial side, and Mr. W. J. Sawkins as Assistant Secretary.

*Freshwater, Yarmouth and Newport.* This was opened in 1888 for goods traffic and in 1889 for passengers, but until 1913 was worked by the Isle of Wight Central Company. Traffic is now conducted with two locomotives, one petrol rail motor, 12 passenger carriages, and 31 goods vehicles.

At Ryde, as mentioned elsewhere, the lines and station on the Pier, the Esplanade station, and the track to near St. John's Road station, is the property of the London, Brighton and South Coast and London and South Western Railways, though the Isle of Wight and the Central Railways work the traffic. St. John's Road station is the property of the Isle of Wight Company, and there and at Sandown the Central trains utilise running powers.



SHANKLIN STATION, ISLE OF WIGHT RAILWAY.

As a pleasure ground the Isle of Wight has something for every taste. The principal resorts are Ryde, Cowes, Sandown, Shanklin, Ventnor and Freshwater, and these provide a wide range of interest, from beautiful sands, good bathing, golfing, boating, and the attractions of a modern front and pier with



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plentiful amusement facilities, to the delights of cliff exploration, picturesque chines and landslips and scenic splendour of a high order. There are also many smaller places, such as Bembridge, Brading, St. Helens, Sea View, St. Lawrence, Yarmouth and Totland Bay; and within the scope of a fortnight's holiday one cannot exhaust more than a small proportion of the possibilities of a local season ticket. Rates covering seven days for these are as follows:

| | 1st Class. | | 2nd Class. | |
|---|---|---|---|---|
| | s. | d. | s. | d. |
| Between all Isle of Wight Railway stations .. | 7 | 6 | 5 | 0 |
| ,, I.W. Central Railway stations .. | 7 | 6 | 5 | 0 |
| ,, Freshwater line stations .. | 7 | 6 | 5 | 0 |
| ,, I.W.C. and Freshwater line stations .. .. | 10 | 0 | 7 | 6 |
| ,, I.W.R., I.W. Central, and Freshwater line stations .. .. | 17 | 6 | 12 | 6 |
| ,, Stations in the Island .. | 20 | 0 | 14 | 6 |

Apart from the attractions of the places visited, which includes many of the inland stations as well as those on the coast, the journeys by rail themselves appeal very strongly. From Ryde to Sandown and to Newport exceedingly pretty country is traversed; the Cowes branch borders for a considerable distance the River Medina, where are situated the coal shipping wharves of the Central Company. But the chief honours in this respect must be given to the section through St. Lawrence to Ventnor Town. Entering the tunnel between Whitwell and St. Lawrence (616 yards) inland country is left behind, and on emerging one is high up the cliff side, overlooking picturesque St. Lawrence and the beach far below, with the wide expanse of the English Channel fully revealed. This view, except for occasional interruptions, extends all the way to Ventnor. Here, both railway stations are located high above the beach, with the cliffs towering as high again above the railways. Both stations are neat erections, with modern conveniences. A feature of the train services is that whereas the Isle of Wight Railway provides approximately hourly trains between Ryde and Ventnor, with connections to Bembridge, the Central line operates at convenient intervals comprehensive inter-communications of all routes, with Newport as centre, also connecting at Sandown and Ryde with Isle of Wight trains in the one case, and with steamer services to and from the mainland in the other. Steamer connections are also made at Cowes. On the Freshwater line the services are sufficient, but in addition the petrol rail motor—of engineer's inspection type—is run from and to Newport to make further connections between the principal steamer services. As the accommodation of the car is limited, these connections have to be reserved for through mainland passengers.

On all lines fares are now one penny per mile, third class, thus removing what used to be one of the reproaches of the Island railways, that rates appeared excessive to mainland ideas, though not perhaps so in reality in view of the relatively short distances concerned. On the Central line the first-class rate is now 1½d. per mile, and this will probably become general.

Accommodation is now very good on the Island trains. The Isle of Wight have a number of first class saloon coaches which are very popular, as they give ample window space for viewing the beautiful scenery through which the line passes, though the characteristic four-wheeled stock is now amplified by a number of eight-wheeled coaches. The Central line has bogie, six-wheeled and four-wheeled coaches of a very creditable standard. On the former line the engines are all of the 2–4–0 tank variety; the Central has four of the 2–4–0 type, one large 0–4–4 and one large 4–4–0 tank engine, four 0–6–0 engines of the well-known Brighton "Terrier" class, and one small 0–4–0 engine. On the Freshwater line there is one 0–6–0 saddle tank engine and one Brighton "Terrier," purchased from the London and South Western Railway in 1914. All sections are single line, controlled by staff and ticket or electric train tablet apparatus. A number of employés on these railways are now serving with His Majesty's Forces, 28 per cent. in the case of the Isle of Wight Central Railway, and as on the mainland railways, women are now assisting as ticket collectors, carriage cleaners, and in other capacities, in partial replacement.

Distances are not great, but railway travel within the limits of the Garden Isle presents many features of interest, including a few trains which pass intermediate stations, and which provide good running. A railway tour within the Island is, indeed, full of interest; and to everyone a visit may be recommended, firstly, because of the exceptional attractions which the Island resorts have to offer, and secondly because of the convenient and inexpensive facilities for exploring the "Garden Isle."

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# British Locomotive Practice and Performance.

By CECIL J. ALLEN.

*Photo]* [*Tom M. L. Neish.*

CALEDONIAN RAILWAY.

1 p.m. *ex* Perth, near Buckingham Junction.
4–6–0 locomotive No. 908.

A LETTER from a correspondent in Scotland, commenting on a remark that I made in the July issue, raises some points of such interest as to invite immediate attention. The remark in question—possibly a somewhat exaggerated expression of opinion—was that the 4–4–0 superheater *George the Fifth* type engines on the London and North Western Railway have no rivals among the 4–6–0 locomotives of their own line. My friend, after explaining that he "can only treat locomotive matters from a purely theoretical standpoint," offers some carefully thought-out suggestions as to this apparent superiority, his theories, indeed, applying not only to this particular case on the London and North Western Railway, but also to parallel and equally anomalous instances on other lines. To him it is "entirely reasonable that the *George the Fifth* engines should be found better workers south of Crewe than the 4–6–0's," this not being one of those cases in which "theory differs from practice."

"Comparison with the *Prince of Wales* (2-cylinder 4–6–0) type," the writer proceeds, "shows that the 4–4–0's have boilers of greater steam-raising capacity combined with 'engines' that require less steam, the cylinders being swept out less frequently for the same speed with 6 ft. 9 in. than with 6 ft. 3 in. wheels. It is not surprising, therefore, that when great tractive power has to be exerted and *maintained* up long inclines, the 4–6–0 engines should get 'winded.'"

While agreeing that this is probably a contributory cause, at the same time I think there are other factors to be considered. The boilers of the two types are very similar in design and capacity. In the *George the Fifth* class engines the boilers are 11 ft. 9¾ in. long by 5 ft. 2 in. diameter, and they have a total heating surface of 1,850 sq. ft., made up of 162 sq. ft. in the firebox, 1,385 sq. ft. in the boiler tubes, and 303 sq. ft. in the superheater. As compared with this the *Prince of Wales* class is also equipped with 5 ft. 2 in. boilers, but 12 ft. 7¾ in. long; the heating surface in this case is only 1,816 sq. ft.—firebox 136 sq. ft., boiler tubes 1,376 sq. ft., and superheater 304 sq. ft. The difference, as will be seen, lies mainly in the firebox heating surface, the *George the Fifth* engines exceeding the *Prince of Wales* class in this particular by 26 sq. ft., or nearly 20 per cent. This is due to the entirely different design of the fireboxes in the two cases.

In the *Prince of Wales* type engines the firebox is necessarily shallow, in order to clear the three coupled axles, and it has a depth of only 2 ft. 4 in. in front from the centre of the brick arch to the fire-bars, or 1 ft. 5¾ in. at the back, under the tube-plate. These dimensions in the case of the *George the Fifth* locomotives are 3 ft. 5¾ in. and 2 ft. 6 in., the usual practice with this wheel arrangement of fitting a deep box



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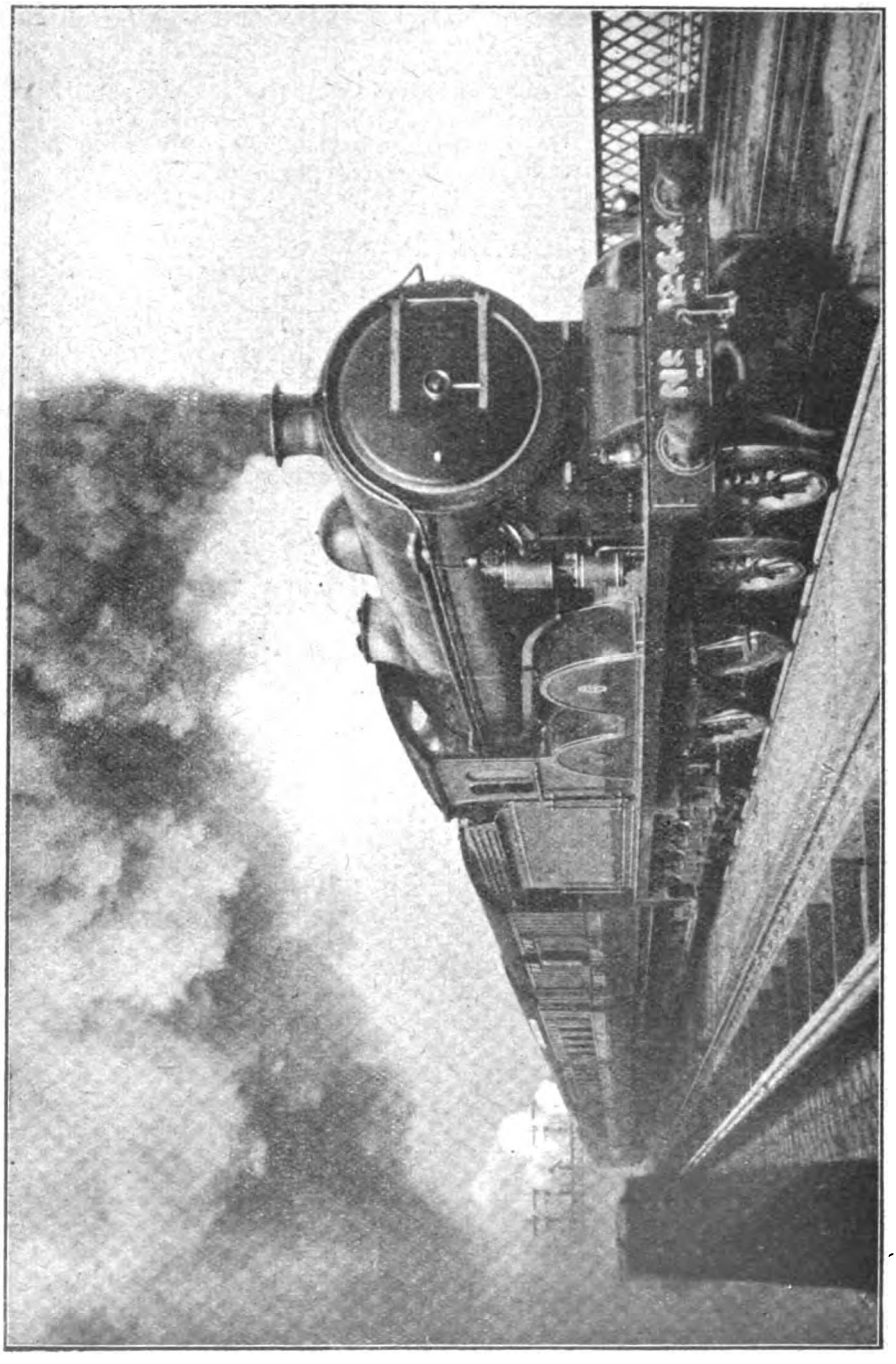

[*R. J. Purves.*

NORTH EASTERN RAILWAY.

12.30 p.m. Newcastle–Liverpool restaurant car express crossing King Edward Bridge, Newcastle-on-Tyne.
Large 4-4-0 engine No. 1244 (Class R1), fitted with superheater.

*Photo*]

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between the two coupled axles being adopted. The former engines, however, have the larger fire-grate area—27 sq. ft. against 22·4 sq. ft. —the length of firebox with the six-coupled engines being 8 ft. 2 in., against 7 ft. 4 in. in the case of the four-coupled engines. As a result of this, it was proved by the late Mr. George Whale, in his exhaustive series of experiments in 1908, that the 4–6–0 *Experiment* engine, with the larger fire-grate, burned only 52·25 lb. of coal per mile against the 57·53 lb. of the 4–4–0 *Precursor*, while engaged on exactly the same work, thus indicating a saving of over 5¼ lb. per mile, or nearly 10 per cent.

Expert firing was doubtless an important factor in securing this result, the shallow firebox, with its minimised space under the fire-hole door and beneath the brick arch, calling for frequent firing, a little at a time, in order to keep the bars from drawing cold air. Conversely, with deep firebox and consequently thicker fire, there is not the same necessity for this very careful firing, and the heavier consumption of the four-coupled engines is thus doubtless partly accounted for. Under *average* conditions of working, therefore, the *Experiments* would very likely make a little less steam than the *Precursors* on this ground alone, while the diminished firebox heating surface would probably be a contributory cause toward the same result. It is hardly necessary to remind readers that the *Experiments* are identical with the *Prince of Wales* engines, and the *Precursors* with the *George the Fifths*, save that the more modern engines have superheater equipment in each case. So it is perhaps reasonable to assume that the average steaming powers of the *George the Fifth* type engines are slightly superior to those of the *Prince of Wales* class locomotives, as principally explaining the slight superiority in the work of the former as compared with that of the latter.

After all, however, the superiority mentioned is very slight. Indeed, another correspondent would have us believe that "the boot is on the other leg." He cites an instance in which the Irish Boat Express left Holyhead 48 min. late (presumably owing to a late arrival of the boat), made up "a few minutes to Chester," was "pulled up after leaving Crewe," and reached Rugby 55 min. late. The speed only "seemed moderate," and the train was worked throughout by *George the Fifth* type engines, with a load of "10 bogies." He adds that in his estimation the *Prince of Wales* type is "a better class for heavy fast passenger trains," and that the *George the Fifth* engines "would give better results if they had a ton more weight on each driving wheel." I rather fear that 10 tons more weight on each driving wheel would not make a driver on the London and North Western Railway or any other line regain time if he did not choose to do so, whether the load be ten or twenty bogie vehicles, and from the very vague particulars given in the letter it is impossible to say whether all or even any of the lost time was due to the engines. Indeed, it is admitted that a few minutes were made up to Chester. Beyond this, however, my second correspondent's letter goes against the weight of evidence of almost every writer on locomotive performance, which has been derived, not from isolated experiences such as this, but in many cases, such as my own, from long and continuous observation. But, as I said before, the difference between the work of the two types is a very small one, and is only apparent on taking a general average, as the *Prince of Wales* engines can put up some first-class work when capably handled.

But *revenons à nos moutons*, or rather to my first correspondent's letter. Comparison between the work of the *George the Fifth* class engines and that of the *Claughtons* he finds more difficult to make. He puts his argument under four heads. As to firebox, "the *Claughtons*, with 171 sq. ft. of firebox heating surface, only gain 9 sq. ft. over the 4–4–0's, and when the shape of the fireboxes are taken into account, the difference is even lessened. I believe I am right in stating that the long and necessarily shallow fireboxes of the *Claughtons* are calculated to give more economical but less furious combustion than one of a deeper and shorter type, such as in a smaller form is fitted to their four-coupled rivals. It is quite disputable, then, which of these two fireboxes has the greater steam-raising capacity." This is a point which was raised in the last paragraph but one, but here I think my correspondent is not altogether correct. In the case of the *Claughtons* the constructional details of the firebox are different, as, though it has only the same depth at the back as that of a *Prince of Wales* class engine, it is inclined downwards at the front to exactly the same depth as that of a *George the Fifth* type locomotive. Further, the larger engine's grate area of 30·5 sq. ft., with its excess of 36 per cent. over the 22·4 sq. ft. of *George the*

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*Fifth* and its capacity for a fire of considerably larger dimensions, while without the hampering shallowness of a *Prince of Wales* firebox, is bound in a somewhat corresponding degree to increase the steam-raising capacity of the boiler tubes.

As to the comparative length of the boiler barrel, the writer proceeds: "The increase of 2 ft. 8¼ in. found in the *Claughton* boiler over that of the *George the Fifth*—14 ft. 6 in. and 11 ft. 9¾ in. respectively—is of little or no value from a steam-raising point of view (I am not, of course, discussing the economical aspect). Indeed, it is not difficult to see that the greater distance between the blast-pipe and the grate in the larger boiler might result in actually decreasing its steam-raising capacity, as the size of the tubes in each case is the same. My conclusion is then that from a steam-raising point of view there is nothing to choose between the boiler of a *Claughton* and that of a *George the Fifth* class engine." In view of the radical difference in external appearance, it is somewhat surprising to realise the comparatively small dimensional difference between the *Claughton* and the *George the Fifth* boiler, both being identical in diameter, while the former exceeds the latter in length merely by 2 ft. 8¼ in. But here again I think that an unduly extreme view has been taken. Were the advantages of the larger boiler so negligible there would be no object in fitting it; the weight thus added, indeed, would be unjustifiable on any grounds. But the whole object of the lengthy boiler barrels of to-day is that a larger proportion of the calorific value of the fuel burned shall be absorbed and turned to account before the remainder is thrown out of the chimney, because the locomotive is at best, from this standpoint, a somewhat inefficient machine. One is bound to admit, therefore, that the boiler of a *Claughton* is likely, not only to be capable of raising more steam in a given time than that of a *George the Fifth*, but also to do so proportionately on a smaller consumption of coal. But the relation of steam-raising to cylinder capacity is another matter, and this my correspondent next deals with.

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.
Down "Southern Belle" express near Coulsdon. 4-4-2 engine No. 39.

In reference to cylinders he remarks: "Unfortunately I have not your tables before me, and therefore cannot verify this part of my statement, but I think I shall be safe in saying that the *Claughtons* have a much larger cylinder capacity than the 4-4-0's." That is so. The four cylinders of the six-coupled engines, 16 in. diameter by 26 in. stroke, have a cubic capacity of 12·11

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sq. ft., against the 9·94 sq. ft. in the two 20½ in. by 26 in. cylinders of the four-coupled locomotives, or 22 per cent. increase. Adhesion in the larger engine is more than proportionate to its enlarged cylinder capacity, seeing that, as my correspondent points out, the *Claughtons* have an extra pair of coupled wheels, and a total adhesive weight of 59 tons against the 38 tons of the 4–4–0 engines. He sums up his conclusions thus: "The increased dimensions of the *Claughtons* (greater cylinder capacity and adhesion weight) are precisely those that are of assistance in starting and in climbing heavy grades, but they are not calculated to assist an engine much between Euston and Crewe, where the grades to be surmounted are not steep, but only very long. More than this, the greater cylinder capacity is actually a disadvantage, because the engine tends to get 'winded,' and it cannot —like the smaller-cylindered 4–4–0—be worked to its full capacity for miles on end, as is possible with 4–4–0 engines whose tractive power is just suited to the conditions. This does not imply that the *George the Fifth* class engines are better than the *Claughtons;* it simply suggests that they are more suited to the conditions between Euston and Crewe. If the loads were increased to 550–600 tons or the ruling gradient to 1 in 100, the *Claughtons* might

LONDON, BRIGHTON AND SOUTH COAST RAILWAY: BRIGHTON–LONDON.

| Distance (miles) | No. of run | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Train | 8.45 a.m. | 8.45 a.m. | 8.45 a.m. | 3.50 p.m. | 60-min. expresses. | | | | |
| | Engine No. | 49 | 70 | 70 | 61 | 42 | 426 | 80 | 37 | 71 |
| | „ Type | 4–4–0 | 4–4–0 | 4–4–0 | 4–4–0 | 4–4–2 | †4–4–2 | †4–4–2 T | 4–4–2 | 4–4–0 |
| | „ Driver | Young | Tompsett | Tompsett | — | Tompsett | Pullen | White | Rampton | Fellingham |
| | Load (tons) | *375 | *375 | *375 | 230 | 190 | 285 | 290 | 290 | 290 |
| | | M.S. | M.S. | M.S. | M.S. | M.S. | M.S. | M.S. | M.S. | M.S. |
| 0.0 | Brighton dep. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.3 | Preston Park pass | 4.15 *a* | *b* | 4.20 *a* | 3.25 | — | 3.17 | 3.27 | 3.30 | 3.35 |
| 4.7 | Clayton (M.P. 46) „ | — | — | — | — | — | 8.03 | 8.15 | 8.19 | 8.30 |
| 5.0 | Summit („ 45¼) „ | 10.45 | 15.20 | 10.25 | 8.35 | 8.15 | — | — | — | — |
| 9.7 | Keymer Junction „ | — | — | — | 13.00 | — | 12.59 | 13.21 | 13.24 | 13.38 |
| 12.9 | Haywards Heath „ | 20.05 | 24.20 *cd* | 19.25 *e* | 16.25 | 15.35 | 15.41 | 16.10 | 16.04 | 16.21 |
| 18.5 | Balcombe (M.P. 32) „ | 27.50 | 35.15 | 27.30 | 22.55 | *p* | — | — | — | — |
| 18.8 | Summit („ 31¾) „ | — | — | — | — | — | 21.54 | 23.02 | 22.25 | 23.10 |
| 21.3 | Three Bridges „ | 31.15 | 38.30 | 30.55 | 25.45 | 25.30 | 24.14 | 25.32 | 24.46 | 25.40 |
| 25.0 | Horley „ | — | *f* | — | 28.40 | 28.45 | 27.06 | 28.43 | 27.54 | 28.42 |
| 29.0 | Earlswood „ | 39.15 | 47.00 | 38.50 | 32.20 | 32.40 | 30.50 | 32.43 | 31.43 | 32.35 |
| 32.1 | Quarry Box „ | — | *g* | — | — | 36.00 | 34.11 | 36.18 | 35.10 | 36.05 |
| 33.4 | Quarry St. (M.P. 17¼) „ | 46.25 | 53.30 | 44.55 | 37.25 | 37.30 | 35.46 | 38.06 | 36.48 | 37.49 |
| 37.3 | Purley „ | — | *h* | *l* | 40.55 *n* | — | 39.31 | 41.55 *q* | 40.4 *q* | 41.37 |
| 40.4 | East Croydon „ | 54.15 *k* | 62.50 | 58.55 *m* | 44.10 | 44.50 | 42.21 | 44.58 | 43.33 | 44.16 |
| 50.7 | London Bridge arr. | 69.40 | ‡74.10 | 73.05 | — *o* | — | — | — | — | — |
| 48.2 | Clapham Junction „ | — | — | — | 56.35 | — | *r* | 53.18 | 51.48 | 53.07 |
| 50.9 | Victoria „ | — | — | — | — | 59.50 | 57.59 | 57.54 | 57.01 | 57.30 |
| 50.9 | net times (mins.) | 65¼ | 62¾ | 64¼ | ¶53¼ | 55½ | 55 | 57¼ | 57 | 57½ |

* 245 tons only from Croydon. † Superheater engine. ‡ To stop outside London Bridge. ¶ To Clapham Junction only. *a* Slight signal check. *b* Dead stand, signals, 3 min. *c* Signal check, Haywards Heath. *d* Long and severe check, Ouse Viaduct. *e* Time lost through leaves on rails. *f* Signals before and after Horley. *g* Slight signal check beyond Earlswood. *h* Very severe signal check, Coulsdon. *k* Six checks between Croydon and London Bridge. *l* Four signal checks and one dead stand for 95 sec. *m* Four further slight signal checks. *n* Signals, South Croydon, 35 m.p.h. *o* Two bad signal checks. *p* Severe p.w. relaying check. *q* Signal check, South Croydon. *r* Signal checks beyond Croydon.

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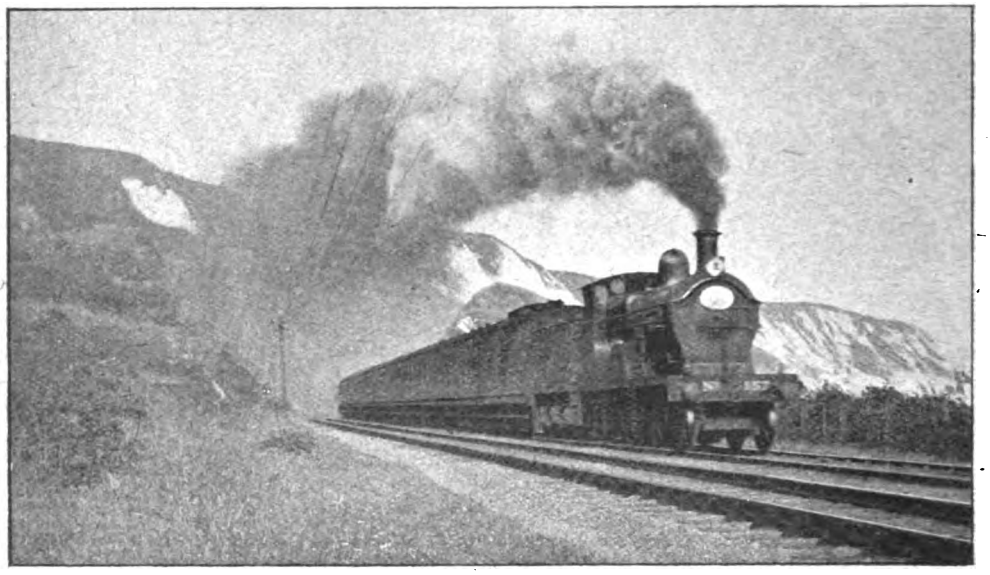

*Photo*] [*Lieut. B. D. Holberton, R.N.*

SOUTH EASTERN AND CHATHAM RAILWAY.

Up Continental express. 4-4-0 engine No. 167.

be found the better engines of the two, although in that case a larger boiler would, I think, be imperative."

The question is really one of proportion. The capacity of the *Claughtons* for raising steam, as compared with the *George the Fifth* class engines, is certainly not proportionate to the difference in their respective cylinder capacities and adhesion weights. If it were, of course, the possibilities of the former in the matter of work should be on the same proportionate scale. I do not think it will be denied that the *Claughtons* have—as indeed they should have—a potential reserve of power exceeding that of the four-coupled engines under special circumstances and when efficiently driven and fired. Two runs that I have recorded in these columns, in both cases north of Crewe, substantially exceed the best I have recorded with the 4-4-0 engines. South of Crewe I have only had one run behind a *Claughton* on a crack express, which I described in the July issue, and in this case the running, though excellent, was very similar in character to average 4-4-0 work, and not quite up to my best records with the latter type. Average *Claughton* work, however, is probably not superior to average *George the Fifth* work, actually, while proportionately to the nominal tractive power of the two types, it may be inferior, especially south of Crewe.

These facts therefore fit in with my friend's contentions, and, save for his somewhat exaggerated comparisons of value, his suggestions are quite reasonable. But it should be remembered that, in most recent cases where such powerful locomotives as the *Claughtons* have been built, the object in view has been very largely economy in working, and it is probable that such a result has been achieved with the *Claughtons* on the stretch of line from Crewe to Carlisle for which, like the *Experiments*, they were primarily designed. The same phenomena may be observed on other lines—I have several pronounced examples in mind at the moment—in which the biggest engines are by no means the most spectacular workers, although doubtless they are coming fully up to the designers' expectations in their performance. Indeed, as I have so often emphasised in these columns previously, the recording of locomotive performance—in relation to times, loads, weather, and other running conditions that are readily available—is really only half a story. The other half—coal and water consumption, mileage between repairs, and all the other details that go so far, not only to amplify, but often also to explain the details of running—is more or less of a closed book to the lay observer. And yet only the conjunction of the two, in their proper

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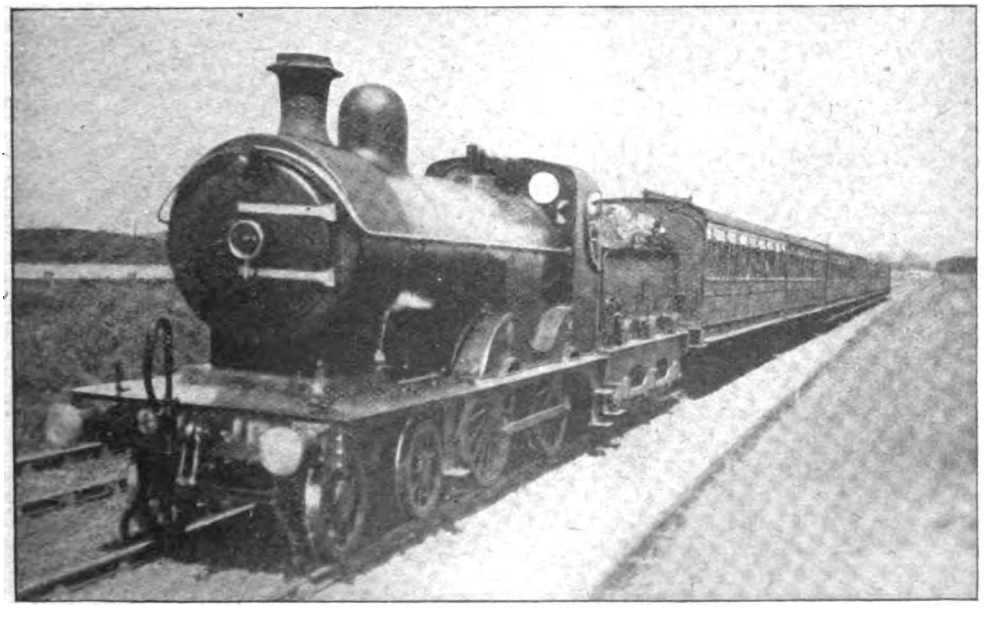
proportions, can afford a comprehensive estimate of the tractive value of any given locomotive type.

Even ordinary running conditions are not always fully appreciated by those that are recording the times. As an example of this I am going to quote rather extensively from a letter received not long ago from a friend engaged in railway work far away in Burmah, whose mind, like those of so many more who have left these shores for distant parts, still runs frequently upon the railways of this country, with their absorbing and many-sided interest. In the October issue of last year I described a Monday morning run on the 8.45 a.m. express from Brighton to London, of which my friend had furnished me with the details, and it is concerning this mainly that he writes. "I should have made it clearer," he says, "when writing to you, that the run on the 8.45 a.m. up was a very ordinary one, illustrating a moderate and (at that time) a weekly performance of the Brighton 4–4–0's with that load. So much so, indeed, that it is in every respect the least meritorious run with that train and load that I have timed, but it was chosen because the driver had no signals against him between Preston Park and Croydon. In that instance also the weather conditions, except just at the start, when the frost made the rails somewhat slippery, were ideal, and, considering that the checks between Croydon and London Bridge caused him to take over 4 mins. longer than on another occasion was taken by the same train with the same load, he yet stopped at London Bridge 5 secs. before time, so he had plenty in hand at Croydon, and was not hurrying." The run here referred to is No. 1 of those tabulated herewith.

"Before describing each of the runs 2 and 3," my friend continues, "I may say that like No. 1 they were all made on Monday mornings with '= 28' loads, in the autumn and early winter of 1905. Both 2 and 3 were behind the Billinton 4–4–0 No. 70, *Holyrood*, an engine I have always found the best of her class, and driven, as was always the case, superbly by Tompsett. The '*Holyrood*–Tompsett' combination you will remember was most eloquently spoken of by the late Mr. Charles Rous-Marten in describing the preliminary trial 60-min. run of the Sunday 'Pullman Limited.'" This phenomenal run took place in 1903, and resulted in the distance between Victoria and Brighton, 50¾ miles, being covered in 48 min. 41 sec., the 50 miles from Grosvenor Bridge to Brighton goods shed occupying 46 min. 11 sec. only.



*Photo]* [*W. H. C. Kelland.*

SOMERSET AND DORSET JOINT RAILWAY.

No. 14 (rebuilt 4–4–0 engine), on train near Bournemouth.

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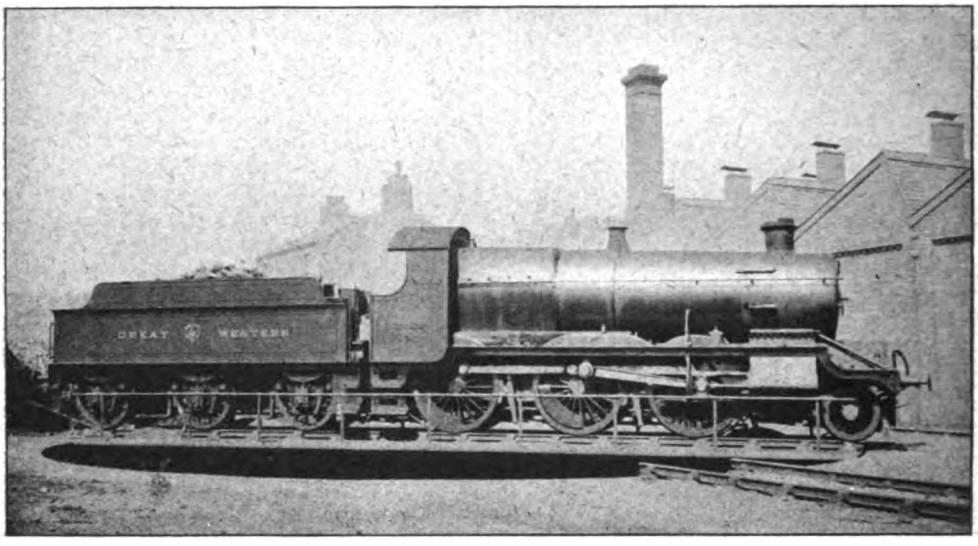

*Photo]* [*W. H. Whitworth.*

GREAT WESTERN RAILWAY.

2-6-0 locomotive No. 4357 on the turntable.

A maximum rate of 90 m.p.h. was attained near Haywards Heath. Curiously enough, while looking up the details of this journey in our contemporary, the *Locomotive Magazine*, I came across the mention of a run with the 8.45 a.m. express from Brighton to London Bridge—the train now being dealt with—on which, with the same engine and driver and a load of " = 34 " or fully 400 tons, 4 min. were gained on the journey, and a maximum effort of over 1,200 I.H.P. was recorded. My correspondent proceeds with some very laudatory remarks concerning Tompsett, which should be enough to make that gentleman blush, were he to read them, but it is quite evident from such details as these, and those that are to follow, that he was " always game, and *always* made up lost time, and generally more." It is a pleasure to record the achievements of such drivers as these.

The letter proceeds to describe run No. 2, No. 1 being the journey that was dealt with at length last October. " Slight fog and drizzle made the rails very greasy, especially at the beginning of the run. For this reason alone the second start from Preston Park was most unfortunate. As usual, owing to the tight booking through Preston Park of the 8.20 a.m. from Worthing to London, in front of the 8.45 a.m. from Brighton, we were checked, but worse than usual we were stopped dead for exactly 3 min. in Preston Park station. It transpired that a 0-4-2 engine on the Worthing train had a badly leaking tube, and a nice dance it led us all the way to Croydon, in spite of our much heavier load. So it was exactly 8 min. after we had left Brighton before we re-started on the 1 in 264 ascent from Preston Park. Tompsett was now on his mettle, and had only 62 min. left if time were to be kept, but of course many other delays intervened. However, we made an excellent start for such a load, despite greasy rails and gradient, and took only 1 min. longer to pass Clayton from Preston Park start than we had done on No. 1 run from passing that point. From Clayton to Haywards Heath we improved on No. 1 trip by 20 sec., but only to run into the Worthing train's signals once more. Checked at Haywards Heath, we were brought almost to a stand half-way up Balcombe bank—on the Ouse viaduct—and went at a walking pace for a long distance. Yet so good was the recovery—again on a 1 in 264 ascent—almost amounting to a re-start—that we passed Balcombe summit sufficiently swiftly to improve on No. 1 run again in the 2½ miles thence to Three Bridges."

" Running finely on towards Horley two more checks, one before and one after that station, spoiled the 'sprint,' and destroyed

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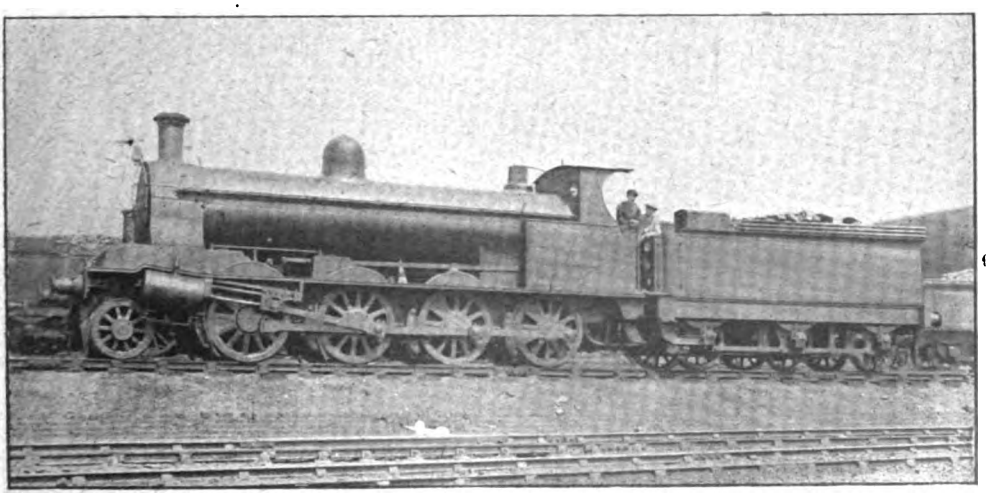
the momentum for the ensuing climb to Quarry. Still, disheartening though this and the continued delays were, we kept gamely at it, and, in spite of yet one more check on the 1 in 200 ascent from Earlswood, we actually improved on No. 1 time between Earlswood and Quarry by 30 sec. Further accelerating from the check referred to, but badly slipping in the tunnel, we nevertheless only took 1 min. 59·6 sec. to get through it—equivalent to an average speed of 36 m.p.h.—and this despite the fact that the incline through the tunnel continues at 1 in 206. Speed was rising appreciably at the actual summit point, and 6 min. net with this load up 4·4 miles at 1 in 163–200–230–206, with a check at its foot, was pretty good work. But we were not yet free from delays. At Coulsdon we were very badly checked again and crawled through that station, with the result that in spite of some smart running afterwards, we took no less than 9 min. 20 sec. for the 7 downhill miles to Croydon. Then, with the load reduced to 245 tons, we did some real 'galloping' from Croydon practically into London Bridge. We were stopped dead just outside the latter station in 11 min. 20 sec. from Croydon—a distance of exactly 10 miles as nearly as could be estimated. This stop was made only 4 min. 10 sec. later than we ought to have arrived in the terminus, but the delays, judging by the other runs, had cost 11 min. 25 sec. So our net time to this stop, 50·4 miles from the start at Brighton, was only 62¾ min."

"Turning now to run No. 3, we find the same engine, driver and load with an almost clear run to Quarry summit, but having the worst possible elements of nature to contend with—a furious westerly side gale, showers of light rain, and a road in places simply covered with fallen leaves. The effect of the gale will be better understood when I mention that the whole distance from Three Bridges to Quarry, with the exception of a short stretch through Earlswood, is on high bank, while the train, which could not be contained in the longest platform at Brighton by the extent of engine, tender, and part of the front brake, must have been something like 800 ft. long, and thus terribly exposed to the fury of the wind. In this case the signal check before Preston Park was rather more pronounced than usual, and both here as well as on leaving Brighton a good deal of slipping was experienced. Yet Clayton summit was passed in 10 min. net and Haywards Heath in 19 min. net. The start of the Balcombe bank was tackled in good style, but in the long cuttings before and after Balcombe station, the fallen leaves were strewn thickly all along. This is in the old forest belt of Sussex, between St. Leonard's Forest to the west and Ashdown Forest to the east, and the gale was tearing all the leaves from every tree, and whirling them into the cuttings like snowdrifts. I have never experienced this



*Photo*] [*W. H. Whitworth.*

LONDON AND NORTH WESTERN RAILWAY.
2-8-0 compound mineral engine No. 1586.

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kind of difficulty before, but the slipping which ensued, although valiantly tackled by Tompsett, brought our speed down and down until it must have been well under 30 m.p.h. The result was that we took over 8 min. to cover the 5·9 miles from Haywards Heath to the summit. Had we not recovered remarkably in Balcombe tunnel—one of the wettest of its kind—the time would have been even longer, but to such good effect did we regain our 'stride' that we got through Three Bridges in the same time from the summit as on run No. 1. Nevertheless, we had taken 30 min. 55 sec. to cover the initial 21·3 miles, or 30½ min. net."

"From Gatwick onwards through Horley we felt the wind at its worst, but the 3·7 miles from Three Bridges to Horley were covered in 3 min. 40 sec., and the initial 4 uphill miles at 1 in 264 beyond took only 4¼ min. *Holyrood* was now going for all she was worth, and after the short respite from the gale past Earlswood, the final and very exposed length up to Quarry Box—3·1 miles at 1 in 163–200–230—took 4¼ min., while lastly the 1·2 miles' ascent through the tunnel at 1 in 206 took 1 min. 50·8 sec. The summit was thus passed in under 45 min. from the start, and in 44½ min. net, despite the appalling weather conditions. This left us with over 9 min. to keep time through Croydon, and 25 min. for the 17·2 almost entirely falling miles into London Bridge. But adverse signals once more intervened. We had no less than a dead stop of over 1½ min. and four checks before Croydon alone, and four more after Croydon also, costing us in all about 8½ min. The net time for the journey therefore works out at 64 min. 10 sec.—a very fine performance, all circumstances considered. You will notice that the 6 min. 5 sec. from Earlswood to Quarry summit was over a minute better than the time on No. 1 run, although the engine on the latter journey had no wind to contend with, while without the leaves difficulty the upper 5·9 miles of Balcombe bank should on the same standard of running have taken but 6½ or 7 min., especially as it is so much more protected from the wind. The equivalent net time, without allowing anything for the gale, would thus be only about 63 min. At any rate, the work was highly creditable. The same day on the return run with 273 tons from London Bridge to Brighton the same engine took only 61 min. 50 sec., as against 65 min. then allowed. Other good runs I have enjoyed on the 8.45 a.m. up from Brighton have been with the same engine and driver as on No. 1 run, but a load of 325 tons only, when the gross time was 68 min. 55 sec., and the net 64 min., and also a journey behind No. 47, *Canada*, driven by Ellis, with 340 tons and times of 69 min. gross, and 65½ min. net. The rails were greasy on both of these runs, with the additional hindrance of fog on the second."

"Tompsett has of more recent years driven No. 42, one of the first non-superheater 'Atlantics.' With this engine on the 1.20 p.m. from Brighton to Victoria—a 60-min. train—and 177 tons (tare) behind the tender, despite difficulties in the way of greasy rails and a bad side-wind, we passed Clayton summit in 8 min. 15 sec., and Haywards Heath in 15 min. 35 sec.—my best times in either instance. Then followed some remarkable climbing up the Balcombe bank. After passing Ouse viaduct the alternate ¼-miles took 15·0, 15·0, 15·0, 15·1, 15·2 and 15·2 sec., and then came a bad relaying slack through the tunnel. So we had climbed 6 miles, nearly all 1 in 264, at a mile-a-minute or faster, and there was scarcely any appreciable drop in the speed even after that. We strictly observed the slack throughout the tunnel, and this cost us fully 2 min. Yet we passed Three Bridges, 21·3 miles, in 25½ min. (23½ net); Horley, 25 miles, in 28¾ min. (26¾ net); and Earlswood, 29 miles, in 32 min. 40 sec. (30¾ net). Quarry bank was climbed at a steady 57·3 m.p.h., and, despite a perceptible easing off in the tunnel, we were past Quarry box, 32·1 miles, in 36 min. from the start (34 net) and Quarry summit, 33·3 miles, in 37½ min., or 35½ min. net—also my best timing, although of course the load was not heavy. We now had to fill in time as best we could, and ambled down to Croydon, with steam shut off after Purley. Even so Croydon was passed in 44 min. 50 sec., or 42¾ min. net (40·4 miles), but thanks to further painfully easy running we arrived at Victoria only a few seconds before time. This run compares well with your runs 8 and 9 in the September issue of a year ago, Quarry box being passed in exactly 1 min. and 2 min. less time respectively, allowing for the Balcombe check." I have tabulated this run in column 5. Nothing further requires to be added by way of comment to my friend's graphic and thoroughly interesting descriptions, which show the kind of work that can be accomplished under difficulties when a driver is out to do his level best.

While I am "on" the Brighton line, I may as well take the opportunity of describing some further up journeys of which I have

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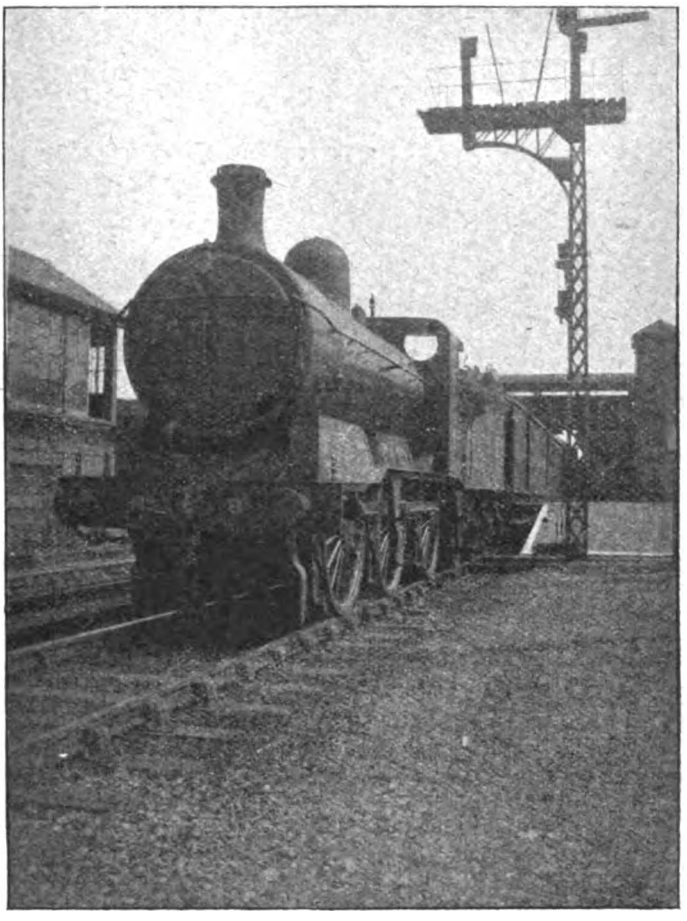
been favoured with details —one further from my friend in Burmah, and a series of four on 60-min. expresses to Victoria from a valued correspondent a good deal nearer home. It is a little unfortunate that my two friends elect to take their Clayton and Balcombe summit times at different points, as thereby the comparison of the running is sightly impaired. The first of these runs was on the 3.50 p.m. express from Brighton to Victoria, with a load of seven 8-wheelers and a Pullman car, and considering the 15 years' age of the locomotive concerned was a very fine piece of work. 25 sec. were gained on schedule time in spite of three bad signal checks, and I cannot help thinking that my correspondent's allowance of only 3¼ min. in respect of these errs very much on the moderate side. The 32 miles from mile-post 44 to mile-post 12 took only 31 min. 5 sec., despite the fact that 18 miles out of this distance are adversely inclined, mainly at 1 in 264, but also with short lengths at 1 in 205, 200, and 165. Balcombe bank — 6 miles at 1 in 264 — was taken so comparatively easily, with a minimum of 49 m.p.h., that the engine was blowing off at the summit. The 9¾ miles from Burgess Hill to Balcombe took 9 min. 55 sec., while the 8½ miles at 1 in 264–165–205 to Quarry occupied only 8¾ min., with a minimum of 48·4 m.p.h. A maximum rate of 70·3 m.p.h. was reached at Hayward's Heath, and a sustained maximum of from 75·0 to 75·6 m.p.h. at Horley. This was indeed "some" going for an engine of such comparatively limited tractive capacity.



*Photo*] [*K. Albrow.*

GREAT NORTHERN RAILWAY.

Stopping main line train at Biggleswade; 0-6-0 superheater mixed traffic locomotive No. 8.

We come now to the five journeys on up 60-min. expresses which occupy columns 5 to 9 inclusive, and a notable collection they make, with an interesting variety of engines. No. 5 has already been described, and there is little to choose between this run and No. 6 in the matter of times, although the load was 50 per cent. heavier in the latter case. On No. 6 run the engine was a superheater "Atlantic," superbly driven by Pullen, another well-known driver. Miles from the Brighton start were covered in 170, 98, 87 and 82 sec.—total 7 min. 17 sec.—and Clayton was passed in the remarkable time of 8 min. 3 sec., at a speed of 47 m.p.h. At Wivelsfield the top speed was 73 m.p.h., while the maintained speed up Balcombe bank was 55 m.p.h. A higher maximum of 76 m.p.h. was attained at Horley, and No. 426 then went up Quarry bank without the speed falling below 52 m.p.h. A final top speed of 67 m.p.h. at Purley preceded one of the fastest times from Brighton to Croydon—

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42 min. 21 sec.—that I have ever seen recorded in ordinary running, and it was not surprising that signal checks were afterwards encountered. Still, despite a late start of ½ min., an arrival 1½ min. early was effected, checks included. The average speed on this run from Hassocks to Quarry box was 63·6 m.p.h.

A fine example is provided in the next run —No. 7—of the capabilities of the Brighton 4–4–2 superheater tanks, the load in this case being the full "Southern Belle" set of seven 12-wheeled Pullmans. The start of this run, indeed, is very similar to that of the one immediately preceding it, only 12 sec. more being taken up to Clayton, with a speed of 46 against 47 m.p.h. at the summit. For the first 4 miles from the start the corrected times were 180, 100, 88 and 82 sec., or exactly 7½ min. in all. After this the work settled down to a more normal level, the maxima at Wivelsfield, Horley and Purley Oaks being 69, 70 and 70 m.p.h. respectively, while the lowest speeds at Balcombe and Quarry were 51 and 45 m.p.h. My friend notes that the engine appeared a little short of steam after passing Three Bridges. Signal checks slightly delayed the conclusion of the run, but for all that the arrival at Victoria was 2 min. early.

No. 8 run was made behind the pioneer "Atlantic"—No. 37—without superheater, and fitted with cylinders 18 in. diameter only. The starting times closely correspond with those of the 4-4-2 tank in column 8, with the same minimum speed at Clayton, and only 4 sec. difference in time (the first 4 miles took 183, 103, 87 and 81 sec.—total 7 min. 34 sec.) but after that the tender engine rapidly overhauled the tank, mainly by very superior uphill work. Thus the minimum speeds at Balcombe and Quarry were 54 and 50 m.p.h. respectively, while the maxima were also higher, being 71 m.p.h. at Wivelsfield and 73 at Horley. Beyond Quarry, however, the engine was decidedly eased, although up to this point the times were within 62 sec. of those on run No. 6. The conclusion of the run suffered no signal checks, but at least a minute was lost by very slow running between Clapham Junction and Victoria in order to avoid too early an arrival. For all that, despite a late start of a minute, the train stopped in Victoria 2 min. before time, or 57 min. 1 sec. after leaving Brighton. But the possible time was one of 56 min. or less.

Finally, we have another excellent 4–4–0 effort in column 9, behind an engine and driver that have given me some first-rate times in the past—No. 71, driven by Fellingham, *alias* "Lingham," as I erroneously described him in a previous article. The first 4 miles from the start in this case took 188, 104, 89 and 82 sec., total 7 min. 43 sec., but the engine was still accelerating when the summit was reached, and had there attained 47 m.p.h. Then followed a swift descent to Wivelsfield, with a top speed of 73 m.p.h., together with a good climb to Balcombe, the lowest rate on the ascent being exactly 50 m.p.h. Past Horley a maximum of 73 m.p.h. was again reached, while on the ascent to Quarry the rate fell to 49 m.p.h. on passing the box of that name, and 48 m.p.h. at the actual summit. Some high speed was indulged in past Purley, the maximum rate being 71 m.p.h., and Croydon was thus passed well before time. After this the engine was eased, but without signal checks the train stopped in Victoria 2½ min. early. At this stage I must "draw rein," reserving the description of some down journeys for another occasion, but it is not possible to close the article without a note of appreciation of the exceedingly fine locomotive work that is expressed in these records. They are, indeed, fit to rank with anything that the country can show in the realm of locomotive performance, and reflect the greatest credit on both the design and the handling of the engines concerned. At the same time it is only fair to say that both my friends who have supplied me with these details are close students of Brighton locomotive work, and I think I shall not be far wrong in saying that these runs represent the "cream" of their fairly extensive Brighton collections.

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# 4-6-0 Four-Cylinder Express Locomotive No. 400:

## GREAT SOUTHERN AND WESTERN RAILWAY.

OUR Colour Plate this month represents the first 4-6-0 express locomotive in Ireland, the first four-cylinder design, and the biggest passenger engine in service within the limits of the Emerald Isle. The severe grades and the exceptional loads which have to be conveyed during the height of a normal summer season, afford adequate justification for so notable an engine. This was put in hand before the war, and work at Inchicore for the Government, depletion of staff, special war responsibilities, and the dislocation caused by the Irish Rebellion, account for the delay in completion; but now that the engine is in service, Mr. E. A. Watson, Locomotive Superintendent, is to be congratulated upon this design. The following particulars amplify those given on the plate:—

MR. E. A. WATSON.
Locomotive Engineer, Great Southern and Western Railway.

The transverse centre line of the inside cylinders coincides with the centre line of the bogie leading axle, whilst the outside cylinders are placed in line with the bogie trailing axle. Piston valves are 8 in. in diameter with inside admission. All four cylinders have a diameter of 14 in. and a stroke of 26 in. Steam distribution is effected by Walschaert gear, actuating the



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valves of the outside cylinders. The valve spindles are continued through the steam chest front cover, where they convey their motion by means of rocker arms through an opening in the frames to the inside piston valve spindles.

A steel casting supports the extended smokebox and in it are formed two steam passages, from either end of which are led bent solid-drawn steel steam pipes to the inside and outside cylinders respectively. The seating for the blast pipe, and the exhaust steam passages are also formed in this casting. Exhaust from the outside cylinders is led by means of a "breeches" connection to the facing of the exhaust passage in the casting. The Schmidt superheater contains twenty-four elements. A circulating system in connection with the engine blower provides for a jet of steam being passed through the elements whilst the regulator is shut, at the same time keeping the cylinders hot and relieving back pressure while running with steam off.

Cylinder lubrication is effected by means of two vacuum "Detroit" lubricators, each of 4 pints capacity. The pipes leading to the cylinders, also those conveying the oil from the footplate to the axleboxes, are brought underneath the lagging, ending in special brass castings affixed to the underside of the boiler. From these brass castings, which project through the lagging, the various pipes to the cylinders and axleboxes are led. Among the special fittings on the engine may be noted a "Dreadnought" ejector, and two 3-in. "Ross" muffled pop safety valves.

The following are the leading dimensions:—

| | | |
|---|---|---|
| Cylinders (4), diameter | 14 | in. |
| Stroke of pistons | 26 | ,, |
| Bogie wheels, diameter | 3 ft. 0 | ,, |
| Coupled wheels, diameter | 6 ,, 7 | ,, |
| Wheelbase, rigid | 15 ,, 3 | ,, |
| ,, total, engine | 27 ,, 1 | ,, |
| ,, ,, ,, and tender | 49 ,, 4 | ,, |
| Total length over engine and tender buffers | 58 ,, 10⅜ | ,, |
| Boiler, height of centre line from rail | 8 ,, 11 | ,, |
| ,, length of barrel | 14 ,, 1 11/16 | ,, |
| ,, dia. of smallest ring, inside | 5 ,, 0½ | ,, |
| Boiler, length of firebox casing | 8 ft. 0 | in. |
| Tubes, outside dia. (for superheater) | 5 | ,, |
| ,, number (for superheater) | 24 | |
| ,, small, outside diameter | 1¾ | ,, |
| ,, ,, number | 173 | |
| Working pressure | 175 lb. per sq. in. | |
| Heating surface, firebox | 158 sq. ft. | |
| ,, ,, tubes | 1,614 | ,, |
| ,, ,, total | 1,772 | ,, |
| ,, ,, superheater | 440 | ,, |
| Grate area | 28 | ,, |

| Weights in working order— | T. | C. | Q. |
|---|---|---|---|
| Bogie | 20 | 0 | 0 |
| 1st driving wheel | 17 | 6 | 0 |
| 2nd ,, ,, | 17 | 1 | 0 |
| Trailing wheel | 16 | 7 | 0 |
| Total, engine | 70 | 14 | 0 |

| Tender— | |
|---|---|
| Coal capacity | 7 tons |
| Tank ,, | 3,345 gallons |
| Wheelbase | 12 ft. 4 in. |
| Wheels, diameter | 3 ft. 9 in. |
| Total weight in working order | 37 tons 6 cwt. |

Except for the remarkable 4-8-0 shunting tank engine completed last year for service in the goods yard at Kingsbridge, Dublin, this is the first design for which Mr. Watson has been responsible since he succeeded, in 1913, Mr. R. E. L. Maunsell as Locomotive, Carriage and Wagon Superintendent of the Great Southern and Western Railway; and it is somewhat remarkable that these two initial designs should provide the two most notable engines in use in Ireland. Mr. Watson had previously occupied for some years the position of Manager of the Inchicore Works of the Great Southern and Western Railway. He began his career in America, first with the American Locomotive Company of Schenectady, and later with the Pennsylvania Railroad at Altoona. Returning to England, Mr. Watson joined the Great Western Railway, being engaged at Swindon in the position of Assistant Works Manager before going to Inchicore to take charge of the workshops there. These works were fully described in the Railway Magazine for October 1913, Mr. Watson being then Works Manager.

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# Locomotive and Train Working in the latter part of the 19th Century.

## THE GLASGOW AND SOUTH WESTERN RAILWAY. [No. I.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE Glasgow and South Western Railway dates as such from October, 1850, when it was formed from the amalgamation of two railways of considerable size, the Glasgow and Ayr, and the Glasgow, Dumfries and Carlisle. It has almost a complete monopoly of South-West Scotland, but at the Carlisle end it joins the Caledonian main line at Gretna Junction, and reaches Carlisle only by virtue of running powers over the lines of its powerful rival, the Caledonian Railway. What the Glasgow and South Western did with itself at Carlisle before the Midland opened its through route to Scotland I do not know. Presumably it was associated with the London and North Western Railway for traffic *viâ* Dumfries, but the present main line provided at least a very imposing tail for a very active head in the Glasgow, Kilmarnock, Ardrossan, and Ayr districts.

Until 1866 the locomotives were associated with the name of Mr. Patrick Stirling, who was chief of this department from 1853 until he took over the reins of the Great Northern in the former year; and for this reason alone, if not on other grounds also, the earlier engines possess considerable interest. It is not given to every locomotive engineer, however eminent, to spend nearly 44 years of his life as a chief locomotive superintendent, for after leaving Kilmarnock, Mr. Stirling put in almost 30 years as chief at Doncaster.

The passenger engines which he designed for the Glasgow and South Western were mostly 2–2–2 "singles" with outside cylinders, of which the best known were the 7 ft. express engines built at Kilmarnock just as he was leaving in 1866. Most of them were completed in 1867–8 by his brother, Mr. James Stirling, who succeeded him. These engines are particularly interesting, for they were the forerunners of the more celebrated 8 ft. singles of the Great Northern, to which they undoubtedly bore a strong family resemblance. There were at least ten of them, Nos. 16, 45, 61, 84 and 151 to 156, and I am not sure whether No. 79 was not another of the class. The cylinders were 16 in. by 24 in., and the driving wheels 7 ft. 1 in. diameter. The carrying wheels were of comparatively small size, being only 3 ft. 7 in. in diameter. The domeless boiler, so long associated with the name of Stirling, provided a heating surface of only 870 sq. ft. Weight of engine in working order was 28½ tons, of which no less than 16 tons 1 cwt. rested on the drivers, and the trailing wheels had to remain content with 4 tons 8 cwt. The brass manhole cover, the splashers with slotted oval holes, and above all the severe cab with side windows, were essentially Stirling features, which he took with him to the Great Northern, where for some years all his engines had cabs of the same design.

These engines were the Glasgow and South Western express engines for two or three years, although the line is far from one adapted to "singles." In the early 'seventies' they were superseded by Mr. James Stirling's 2–4–0 coupled engines, and in their later years—they were broken up in the late 'eighties'—several of them collected at Dumfries, where they were principally used for piloting the main line express trains up Nithdale to the New Cumnock summit. They were also used from Dumfries on the Port Patrick and Wigtownshire joint line.

In connection with the use of these single engines, it should be stated that in their main line days the Glasgow and South Western was an easier line to work than it now is,



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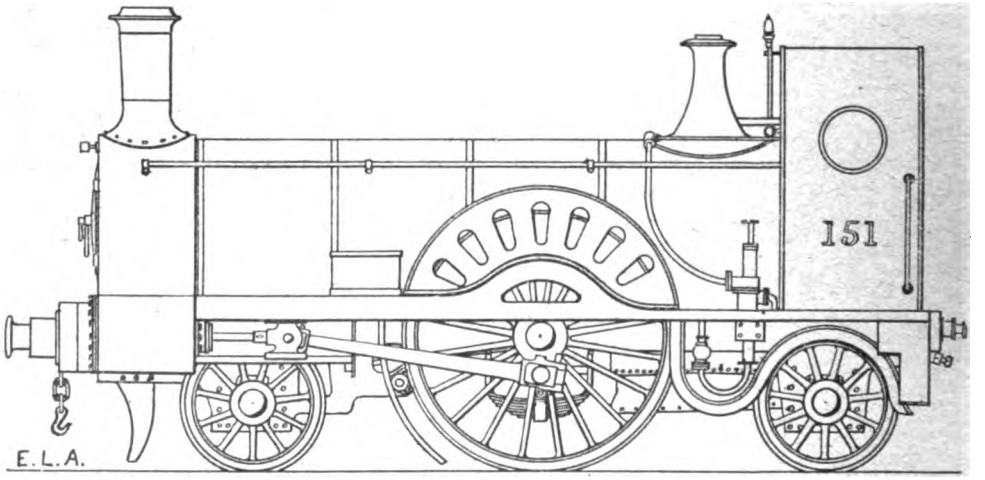
for although there always was the climb to New Cumnock, there did not then exist the heavy section from Glasgow to Kilmarnock *viâ* Barrhead. The old main line took a fairly level though long *détour viâ* Paisley, which added some 10 miles in distance.

Mr. Stirling always maintained an opinion that the fewer wheels of an engine that were coupled the better for the engine, and, as I believe he used to express it on the Great Northern, he did not see why their "legs should be tied together." Consequently, for goods service almost all his engines had only four wheels coupled, and were of the 0–4–2 type, which he also elaborated on the Great Northern in his celebrated "mixed traffics," note that the majority of the Glasgow and South Western engines of the 1853–1863 period came from the works of this firm. A number of the 0–4–2 engines were built by Sharp, Stewart & Co., of Manchester, of which two of those intended for the Glasgow and South Western were sold by the makers to the London, Chatham and Dover Railway, on which line they ran for many years in the Chatham district as Nos. 1 and 2.

Mr. Stirling's later 0–4–2 goods engines, Nos. 141 to 150, built by Neilson & Co. in 1865, were somewhat larger and had 5 ft. wheels with 17 in. by 24 in. cylinders. Of these, three or four were at work until the last two or three years.




"7 FT. SINGLE" DESIGNED BY MR. PATRICK STIRLING AND BUILT AT KILMARNOCK, 1866.
Cylinders 16 in. by 24 in.

engines which I have already mentioned in connection with the latter line. The majority of the Glasgow and South Western 0–4–2 goods engines of this time had 5 ft. wheels and 16 in. by 22 in. inside cylinders. They all had domeless boilers, and cabs of the same pattern as the single express engines. Mr. Stirling was probably the first British engineer to provide efficient protection for the men on the footplate. The domeless boiler he, I believe, brought from Messrs. R. and W. Hawthorn, of Newcastle, where Mr. Stirling had spent some of his early years, and in this connection it is interesting to

Finally, in 1866 Mr. Stirling took the plunge and designed a six-wheel coupled goods engine, of which half-a-dozen were built at Kilmarnock, Nos. 58, 94, 99, 100, 101 and 102. Ten more, Nos. 160 to 169, were also constructed by Messrs. Neilson & Co. in the same year. These had 5 ft. 1 in. wheels and 17 in. by 24 in. cylinders. But the flagrant enormity of a six-wheels coupled engine seems to have proved too much for his feelings, and he promptly packed up his kit and departed from Kilmarnock for Doncaster, leaving the new engines to be completed by his brother and successor, Mr.

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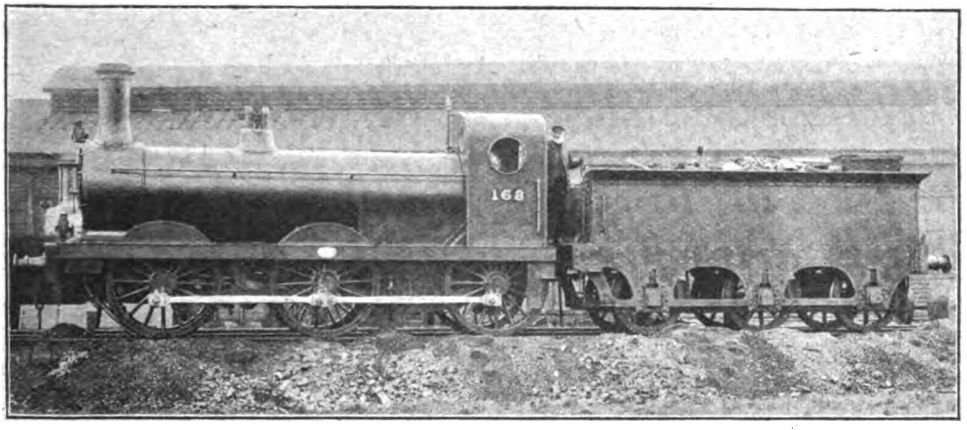
James Stirling. But at Doncaster he found that the six-wheels coupled engine was a real necessity, and he forthwith started a new class of this type, though he adhered tenaciously to the 0–4–2 "mixed traffics" for express goods trains. As to what the celebrated old engineer's opinions would have been, had he lived a few years longer to see Mr. Manson's six-coupled *express* engines on his old line, I do not like even to hazard a guess, but there is no doubt that they would have been extremely interesting.

The new locomotive chief of the Glasgow and South Western, Mr. James Stirling, carried on most of the family traditions. His first express engines, which were built at Kilmarnock during the years 1868 to 1870, were of the inside framed 2–4–0 type with 6 ft. 7 in. wheels and 17 in. by 24 in. cylinders, and had domeless boilers and the characteristic cabs. The standard boiler pressure was then 130 lb., though many of the older engines had only 120 lb. pressure. The new engines were 15 in number, as follows :—Nos. 8, 72 to 74, 77, 78, 80 to 83, 85, 170, 171, 182 and 183. In 1870–1, ten similar passenger engines with wheels 6 ft. 1 in. diameter were constructed, also at Kilmarnock: Nos. 59, 60, 62 to 64, 71, 75, 76, 103 and 104. The 6 ft. 7 in. engines had only a few years' work on the Carlisle main line trains, when they were superseded by Mr. Stirling's celebrated 4–4–0 bogie engines in 1874–5. They did their share of the "Coast" passenger service from Glasgow, and finally some were relegated to Dumfries for the Port Patrick road, and also for piloting work. Although they were put on to the duplicate list in 1892–1894, they still performed many subsequent years of work, and one—possibly the only—survivor, No. 71A, is still, I understand, at Ardrossan, and works fish and stock trains to St. Enoch. I am not sure whether No. 85A still survives, but within a comparatively recent date it was at work between Ayr and Muirkirk, on which service it is shown in an accompanying illustration.

We now come to what were probably the most celebrated express engines that ever ran on the Glasgow and South Western, but in using this description of them I do not mean to imply any inferiority in the many engines that succeeded them. The engines in question were Mr. James Stirling's 7 ft. coupled 4–4–0 bogie engines, of which there were at one time 22 in service, all of which were built at Kilmarnock, as follows :—

1873. No. 6.
1874. Nos. 30, 95, 97, 98, 110, and 115.
1875. Nos. 36, 96, 106, 107, and 108.
1876. Nos. 15, 20, 44, 111, and 112.
1877. Nos. 3, 4, 10, 11, and 39.

The cylinders were 18 in. by 26 in., the diameter of the driving wheels 7 ft. 1 in., and of the bogie wheels 3 ft. 7 in. The engine had a total heating surface of 1,111·8 sq. ft., of which the 252 1½-inch tubes supplied 1,027·6 sq. ft. The total weight was 39 tons




0–6–0 COODS ENGINE (1866-7) DESIGNED BY MR. PATRICK STIRLING, AND REBOILERED BY MR. SMELLIE.

Coupled wheels 5 ft. 1 in. diameter. Cylinders 17 in. by 24 in.

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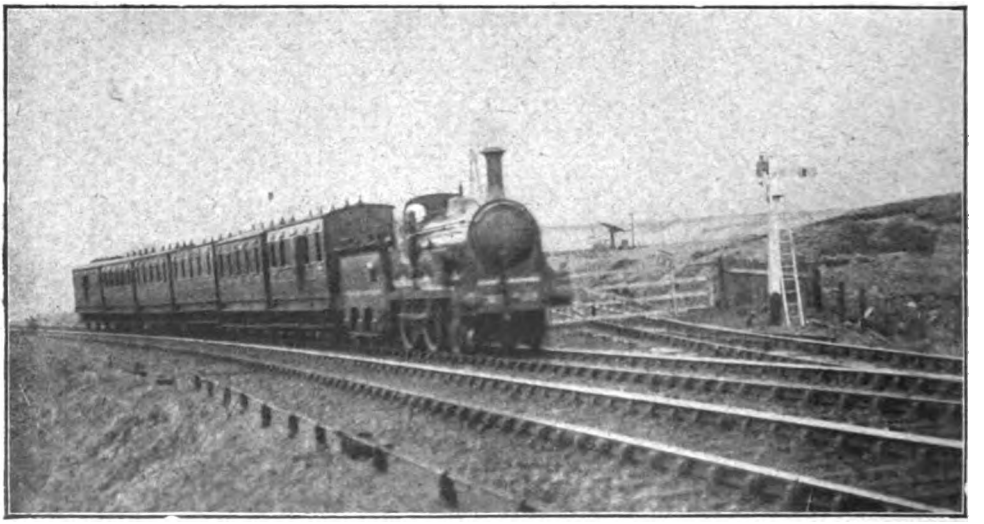
in working order, and the boiler pressure, which had hitherto not exceeded the 130 lb. standard, was raised in these engines to 140 lb.

They had two claims to special distinction. In the first place, No. 6 was almost the earliest of the British standard inside cylindered 4–4–0 engines to be built; in fact, there were only two in service on the North British Railway when Mr. Stirling made his designs. Secondly, the majority of them came out with the well-known Stirling steam-reversing gear, familiar to those readers who know the South Eastern engines. In the Glasgow and South Western engines the actuating cylinders of this gear were placed inside the cab on the right-hand side. In 1895 to 1897 Mr. Manson placed these engines in the duplicate list, when they became Nos. 39A, 44A, etc., and this was the last I saw of them for some years, and I concluded that they had been scrapped. But a few years ago, when I revisited Kilmarnock, some 4–4–0 engines, Nos. 195, 197, and 200 entered the station, the sight of which made me rub my eyes. The old 0–4–2 engines bearing these numbers I had known, but they were nothing like these.

There was no mistaking the Stirling 4–4–0 engines, evidently resurrected from somewhere, and the only difference in their latest appearance was that the splashers were closed and the old round-topped cabs had been replaced by cabs of Mr. Manson's pattern. Recent enquiries have revealed the fact that after having been relegated as "A's" to the Glasgow and South Western by-ways, sixteen of them were re-boilered with the old form of domeless boilers,* and presented with a new lease of life as Nos. 191 to 206. I do not think they visit their old haunts at the Carlisle end, but limit their performances to the section between Ardrossan, Kilmarnock and Glasgow. Let us hope that the veterans still have a long career before them and that Mr. Drummond will not be in too great a hurry to break them up.

Mention of these celebrated engines brings to mind the Midland Scottish train service, with which they were always associated in my earliest recollections. In May, 1876, the Midland opened the Settle and Carlisle line, and forthwith inaugurated a new service of Scotch expresses with Pullman cars between St. Pancras and Glasgow (St. Enoch). The Stirling "bogies," then stationed at Glasgow and Carlisle, worked the trains, of which the down day express (10.30 a.m. from St. Pancras) was allowed the following schedule:

| | Miles. | Min. | Speed M.P.H. |
|---|---|---|---|
| Carlisle to Dumfries .. .. | 33 | 42 | 47·15 |
| Dumfries to Kilmarnock .. | 58¼ | 78 | 44·8 |
| Kilmarnock to Glasgow .. | 24¼ | 35 | 41·6 |



*Photo]* [*D. Murray.*

MUIRKIRK-AYR TRAIN PASSING WELLWOOD JUNCTION.
2-4-0 engine No. 85A.

* I understand that two of the class now possess domed boilers.—E. L. A.

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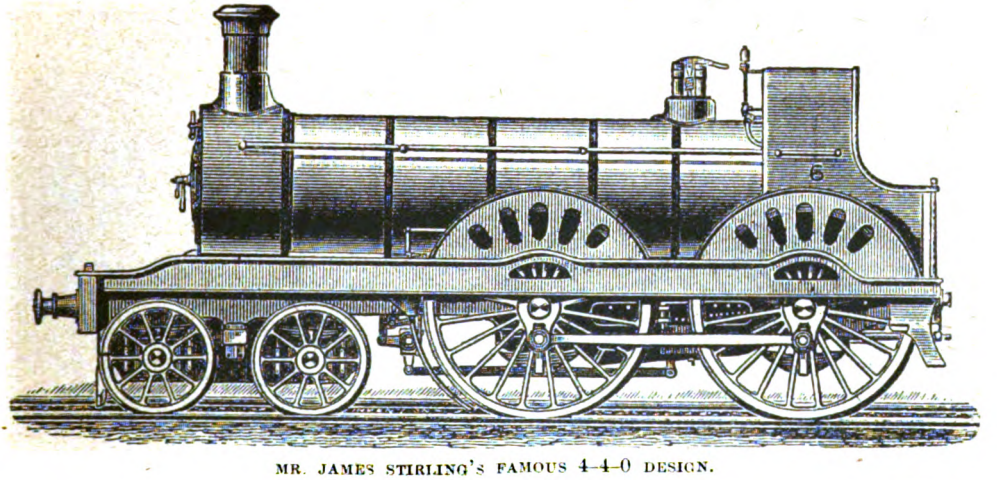
The load consisted usually of one Pullman car, one and sometimes two 12-wheeled bogies of the old Midland 1875 pattern, and about five or six six-wheeled coaches and two vans. Considering the nature of the gradients the speeds were very good, but a pilot engine was generally requisitioned from Dumfries to New Cumnock or through to Kilmarnock. The trains were all fitted throughout with the Westinghouse brake, which for some years was the standard on the Glasgow and South Western line.

The gradients are stiff. From Carlisle to Dumfries the line may be described as generally easy, although there are several undulating stretches of 1 in 200. After leaving Dumfries there is a long ascent up to New Cumnock of 35 miles, of which some 12 miles vary from 1 in 150 to 1 in 200. From



MR. JAMES STIRLING'S FAMOUS 4–4–0 DESIGN.

New Cumnock the line drops steeply to the approaches to Kilmarnock, and of this 18-mile section most of the fall varies between 1 in 100 and 1 in 150. From Kilmarnock to Glasgow *viâ* Barrhead is something after the fashion of the roof of a house, with banks of 4½ to 7 miles of 1 in 70 to 1 in 75 on either side of the apex.

As regards goods engines, Mr. James Stirling fully maintained the family reputation. He toyed with the six-wheels coupled design by ordering ten more in 1869 from Messrs. Neilson & Co (Nos. 172 to 181), and then had a severe relapse which lasted for some years, during which only four-wheels coupled goods engines were built. However, the brothers Stirling were on the majority side so far as Scotland was concerned. The deep-rooted objection on the part of most of the Scotch locomotive engineers to the six-coupled engine was almost universal in that country. Even as late as 1882 the Caledonian, out of a total stock of 725 engines, could muster only 44 six-coupled tender engines, nearly all of which were used for local coal trains in the Glasgow district. The Highland and the Great North of Scotland had none at all, and it was only the North British, which had always used six-coupled engines, that "spoiled the tartan."

Mr. J. Stirling's 0–4–2 goods engines of 1870 to 1878 were very much on the lines of his brother's "mixed traffics" on the Great Northern, and all of them had 5 ft. 7½ in. coupled wheels and 3 ft. 7½ in. trailing wheels. The cylinders of the twenty engines Nos. 187 to 206, built by Neilson & Co., 1870–1, were 17 in. by 24 in.; then followed ten engines by Messrs. Dübs in 1873, Nos. 208 to 217, with 18 in. by 24 in. cylinders, and finally a series of 60 engines, Nos. 221 to 280, dated 1874–8, with 18 in. by 26 in. cylinders. All these, except ten, came from the works of Neilson & Co., and Nos. 251 to 260 from Dübs & Co., so that none of the type were ever built at Kilmarnock. Nos. 221 to 280, the largest, had 1,157 sq. ft. of heating surface, and the boilers were variously pressed at 120 lb. and 130 lb. only. The weight in working order was nearly 33 tons. Steam-reversing gear was fitted to the later engines from No. 241 upwards.

Finally, Mr. Stirling came to the conclusion that six-coupled goods engines were either necessary or at least advantageous, and he designed and put in hand at Kilmarnock twelve 0–6–0 engines with 5 ft. 1 in. wheels

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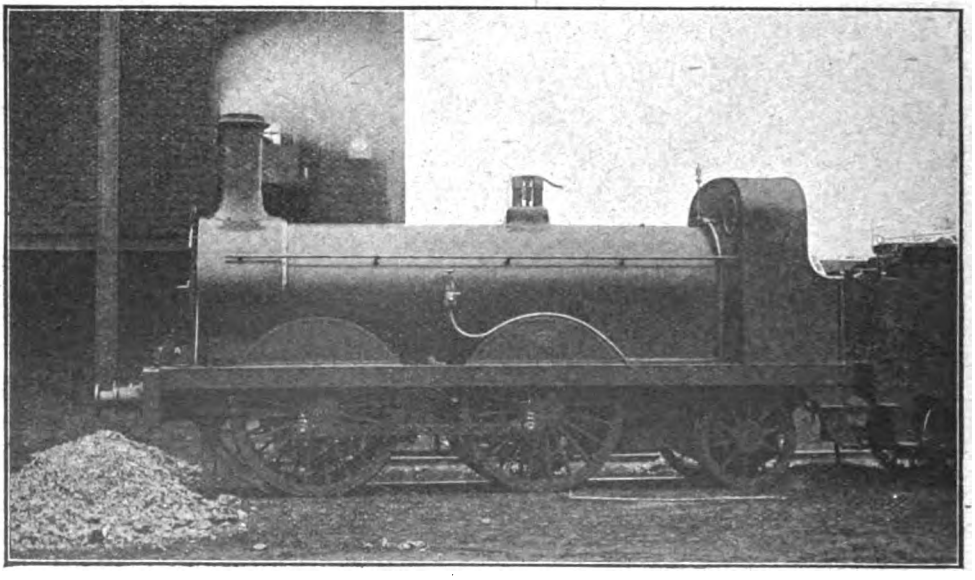
and 18 in. by 26 in. cylinders. And then history repeats itself; Mr. James packed up his "lares and penates" and departed to Ashford, exactly as his brother had left for Doncaster eleven years before, leaving the unfinished 0–6–0 engines to be completed by his successor, Mr. Hugh Smellie, who, according to the chronicles of Kilmarnock, reigned in his stead. The 0–6–0 engines just referred to are those which some of the recent correspondents of the RAILWAY MAGAZINE have termed the "Black goods," and they came out at the end of 1877.

Returning however once more to four-coupled goods engines, one would, perhaps, be inclined to think that although this type of engine may be all very well for fast main line goods trains, yet for coal trains something considerably more powerful would be necessary. But the mineral engine of the Glasgow and South Western evolved by the brothers Stirling completely upset any preconceived ideas of this sort, for it took the form of a small undersized four-wheeled engine with 5 ft. wheels, inside cylinders only 16 in. by 22 in., and a boiler pressure of 120 lb., later reduced in many of the class to 110 lb. These engines worked the colliery branches, and were certainly well adapted for sharp curves. Four of them, dating from 1872–4, are, or were, still at work, of which R47 (formerly No. 92) is, I understand, stationed at Ardrossan, and they must have proved well adapted to the peculiar needs of the Glasgow and South Western or they would not have survived so many years.

Another class of engine designed by Mr. J. Stirling and completed at Kilmarnock by his successor, consisted of four 0–4–4 side tank engines for passenger traffic. But before describing these, this seems a fitting opportunity for a few remarks on what has always been to me one of the peculiar Glasgow and South Western forms of Chinese puzzle.

Tank engines! If anybody goes to Kilmarnock he doesn't want to talk about tank engines. They don't like them there, or, at least, they did not seem to have much affection for them until quite recently. Here is a railway with a heavy local and suburban traffic extending for some 30 miles or so from St. Enoch station, and only a few sporadic attempts have been made to use an extremely limited number of tank engines. I suppose there must have been sound and valid reasons underlying this, but I do not know them. Is it a question of water supply not being available just where the tank engines would require it? There are a few people in the Glasgow district who consider that water is a much over-rated liquid of quite secondary importance. Nevertheless,



0–4–2 "FAST GOODS" ENGINE (J. STIRLING), NO. 234.
Coupled wheels 5 ft. 0½ in. Cylinders 18 in. by 26 in.

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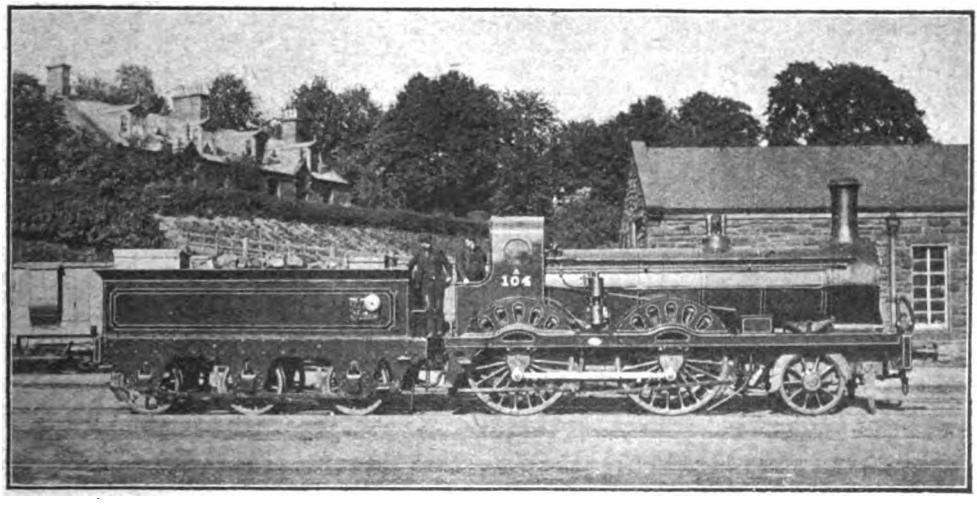
Mr. Drummond, greatly daring, has recently put into service some very handsome looking 0–6–2 tank engines, so perhaps we may now see a change in this respect.*

The 0–4–4 tank engines in question were four in number and came out in 1879, Nos. 1, 2, 21 and 38, and a visitor to St. Enoch, where they are stationed, can generally see at least one of them there. They have 5 ft. 7½ in. wheels and 18 by 26 in. cylinders, and, of course the domeless boilers, for all Glasgow and South Western engines had these until Mr. Manson started the dome era in 1892. In most respects they were almost replicas of Mr. Stirling's South Eastern bogie tank engines, which are probably well known to most of the readers of the RAILWAY MAGAZINE.

In 1876–7 Mr. Stirling also built six 0–4–0 side tank shunting engines with inside cylinders, and for something like twenty years they remained the only shunting tank engines on the line, except four smaller "pugs" which were purchased outside.

In one respect the Glasgow and South Western has steadily maintained an old and formerly almost universal custom. The dark green colour of their engines is the same to-day as that used on most British railways in the 'sixties and early 'seventies, and it is almost the only railway that has survived the various changes in the colour schemes of the locomotives of the country, for the light greens of the North Eastern, Great Central, etc., are quite different shades from those originally used on these railways.

But in the matter of the colour of their carriages there has been a radical change. Until nearly the close of the "'eighties" the Glasgow and South Western coaches were all dark green, but at the time mentioned they copied their Midland partners and adopted a colour hardly distinguishable from the latter company's well-known red. It is true that some of the trains which formerly left Carlisle for Glasgow had a somewhat "piebald," or perhaps I should say "tartan," appearance, for although the through trains consisted in the main of red painted joint stock from the Midland, there used to be a sprinkling of the dark green coaches added at Carlisle, which rather spoilt




*Photo*] [*Locomotive Publishing Co., Ltd.*

2–4–0 PASSENGER LOCOMOTIVE NO. 104A (1871, J. STIRLING).
Coupled wheels 6 ft. diam. Cylinders 17 in. by 24 in.

* The use of tender engines appears rather to be part of the policy of providing for local requirements by stops here and there made by trains travelling fair distances, instead of making a distinct line of demarcation between local and longer distance train services. At any rate, the timetables for many years have indicated this characteristic, and since less attention than ever has been given to inner-suburban work, in view of tramway competition, is even more marked than it was. Mr. Ahrons further remarks that during the 'eighties—in fact, down to 1896, there were only ten small four-wheeled shunting engines on the line, and these were mostly employed in docks and at ports on the coast, and there was not a single goods tank design on the railway until Mr. Manson built a few some eight or nine years ago. Ed. R.M.]

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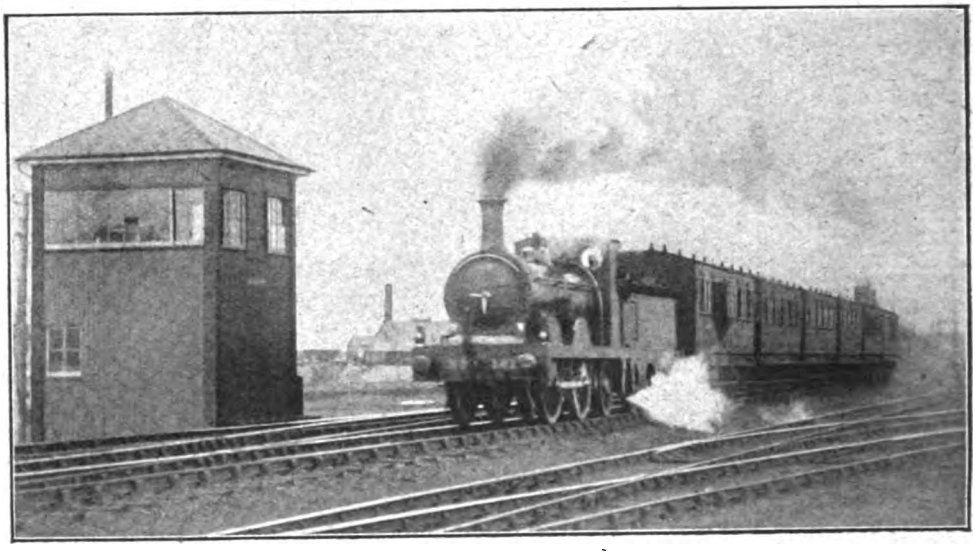

*Photo]* [*D. Murray.*

MUIRKIRK–AUCHINLECK TRAIN PASSING MUIRKIRK NO. 1 CABIN.
0–4–2 engine No. 181.

the look of the trains. These green Glasgow and South Western carriages were to be seen almost daily on the Midland line as far south as Bradford and Leeds, and occasionally but more rarely they were sandwiched into the Midland Scotch expresses right through to St. Pancras. For some ten years or so from about 1880, the Midland used to borrow them for the Easter excursion traffic between Bradford and Morecambe, and on the day before Good Friday, three long 20-coach trains of Glasgow and South Western Railway stock were despatched from Carlisle to Bradford for this purpose. At the end of a week or so they were returned to their owners.

The joint coaches from 1876 and for about twenty years afterwards were lettered M.S.J.S. (Midland Scottish Joint Stock), and this implied that the North British also had a share in their ownership. In 1884–5 a certain number of M.S.J.S. six-wheeled coaches were built both at Cowlairs and at Kilmarnock or Barassie, otherwise most of them had been supplied from Derby. It was somewhere about 1897 that the M.S.J.S. arrangement came to an end; it had the additional disadvantage that the North British used the Westinghouse brake, and by this time the Glasgow and South Western had fitted up with the vacuum. In place of the old coaches there then appeared the "M. & G.S.W." and "M. & N.B." stock of the present day.

(*To be continued.*)

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# Railway Electrical Progress and Practice.

## AN ALL-ELECTRIC MAIN LINE RAILWAY OF THE FUTURE. [No. III.]

By "INDICATOR."

(*Continued from page* 43), *June Number, Vol. XXXVIII.*)

IT is now necessary to devote some attention to the engineering features associated with the "Rayhampton, Marsden and Belmont" Railway; and in this connection readers may be reminded that as an alternative to almost prohibitive expenditure which would have been involved by enlargement of the terminus at Rayhampton, widenings thence to Burnett Place, and other heavy works, the course was adopted of sectionalising and partially remodelling the Central station, erecting an upper structure over existing lines as far as Burnett Place, providing entirely independent goods lines from the Moortown Goods Depôt (alongside Elson Road station), and constructing an elaborate system of interconnecting flying and burrowing junctions, in order to avoid as many conflicting train movements as practicable.

Naturally these entailed enormous expense, but some of them would have been necessary in any case, while others were considered preferable to more obvious methods after full investigation, and in view of certain factors peculiar to the situation and which had to be taken into account.

Before dealing with the terminus itself, it will be convenient to consider the general character of the line, and its lay-out and traffic features as far as Carling Road on the main line and New Park on the western route. Four diagrams have been prepared for reference; but the first may, for the time being, be dismissed by pointing out that at Rayhampton Central station platforms Nos. 1, 2, 3, 4, and 5 have connection only with the Up and Down W.S. (West Suburban) lines, except for exchange spur D; Nos. 6 and 7, together with the centre road N, connect with the Down Fast line which, between the "Up Platform" and "Up Route" signals is, in effect, a single track; Nos. 8, 9 and 10 similarly serve the Up Fast line; and Nos. 11, 12, 13, 14, 15 and the Milk and Parcels Platform M are dealt with by the Up and Down E.S. (East Suburban) lines. Immediately beyond the "Up Route" signals there are three down and three up lines, the former rising on a 1 in 50 grade to the upper deck of a two-storey structure, as shown in the second diagram. At this stage no reference need be made to the signalling, which, however, includes some special features, as will be seen.

When first proposed it was argued that the suspension under a steel structure of restricted height of overhead conductor wires carrying high tension currents was undesirable. Seeing, however, that such conductors had for years been safely passed under low girder bridges and through tunnels, there was not serious ground for this objection, and in practice no trouble has ever been experienced from such causes, though, of course, certain special measures had to be undertaken.

For part of the distance the railway was built upon low arches, and, therefore, it was not a difficult matter to incorporate these in a strengthening structure to carry the upper level lines. In places warehouses and other buildings had been erected very close to the railway, and this was one of the reasons for adopting the two-storey principle instead of widening. There were originally four lines on the lower level, but by reducing to three lines additional space was rendered available to obtain good foundations and supports for the upper structure. From Elson Road to Burnett Place the goods lines are alongside the low level passenger lines, as was the case for many years before any of the modern



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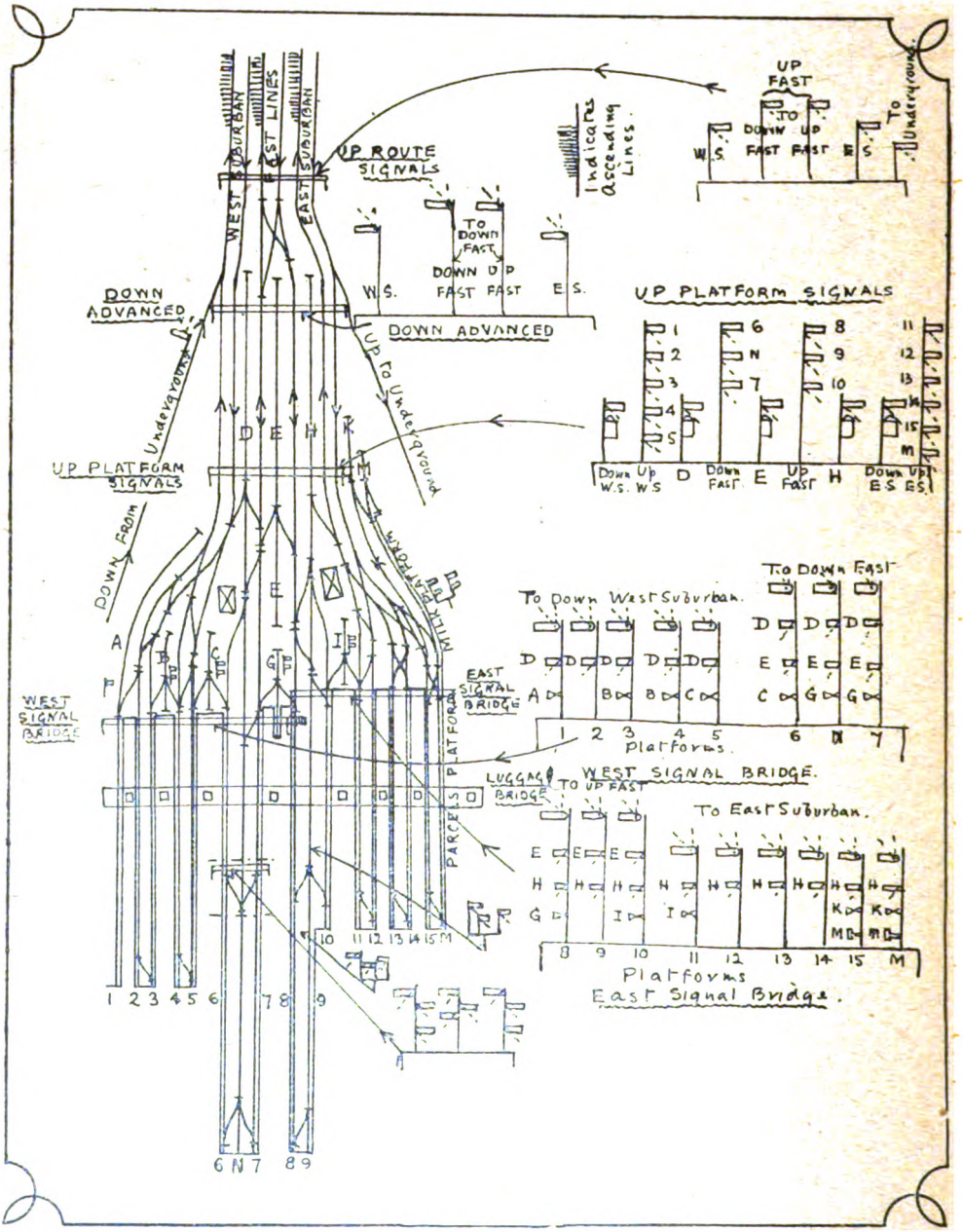
works were undertaken. The diagram showing the two-storey structure is only included to indicate the general features. Actually a number of variations in engineering construction are utilised, with a considerable amount of ferro-concrete work in regard to foundations and pillars to the upper deck, filled in with longitudinal and transverse girders. The engineering features of this work would, indeed, justify extended consideration, but that is not necessary in a general article such as this.




I.—PLAN OF RAYHAMPTON CENTRAL STATION, WITH PRINCIPAL SIGNALS.

On the upper deck, therefore, beyond the combination of the converging structures which carry the grade from the lower to the upper level, there are three down lines,

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respectively W.S., Fast, and E.S., while below are corresponding up lines. Outside the Central stations are the down and up connecting lines from the Underground Railway, the connections being in tunnel. The up line is right away from the down line, as a result of original construction. With the modern lay-out this is inconvenient, and a more suitable arrangement would be that the up line should diverge from the Up W.S. line at the same position as the junction with the Down W.S. line. This would involve a crossing of tracks, a consideration at busy periods; and there were constructional objections to building a new line, and so up trains running through to the Underground Railway are all worked over the Up E.S. line, notwithstanding that a majority of them are run on western routes.

At Elson Road, crossovers at one end of the station give access from Down Fast to either Down W.S. or Down E.S.; while at the further end are connections from either suburban road to the Down Fast line. Below are similar connections for up trains. Other connections are given at Burnett Place, so that if required a train to or from any platform at the Central station can be worked from or to any line beyond Burnett Place. In practice such movements are, on week-days, restricted to a minimum, traffic being systematised as far as practicable; and it is mainly in the case of Johnstone and Chillington expresses leaving Rayhampton Central *vid* the Down W.S. line which transfer to Down Fast either at Elson Road or (to avoid clashing with a down fast main line train) direct beyond Burnett Place station, and Arklow expresses from No. 11 or 12 platform, which similarly transfer between Down E.S. and Down Fast, that such connections are used. Otherwise the crossovers are confined to instances where a main line fast train has to be worked from or to a platform in the western or eastern portion of the terminus, the movement of certain fast suburban trains at periods of pressure, through Underground trains on tracks other than those in direct connection with the loops adjacent to the Central station, traffic to or from the Parcels and Milk Platforms in the terminus, and other special operations which must occur at intervals throughout the day. If a two-stage transfer is necessary, the usual course is to make one at Elson Road and one at Burnett Place.

Diagram III. shows the junctions beyond Burnett Place station. Both routes involve a descending grade for up trains, as the general level is rising, so that about half a mile distant two four-track main lines are constituted. On the western route the order of tracks is (1) W.S. Down, (2) Fast Down, (3) W.S. Up, and (4) Fast Up. There is in addition an Up W.S. loop line built alongside the goods lines, which are given distinct "burrowing" connection with the main goods lines. The Up loop provides for the direct passage of Underground trains to the Up E.S. line at Burnett Place without crossing other tracks.

From Diagram IV. it will be seen that the Up loop diverges between the Down Fast and W.S. Up lines, thence descending and passing under the direct Up lines. The goods lines are continued on a low level a short distance further and then brought up to the running level between the Up and Down lines, with crossovers enabling goods trains to be run on either track of each pair.

The arrangement of tracks noted is continued to New Park station, where flying and burrowing junctions towards Stoneford Junction or Weston are provided. As the Up Fast line is outermost a direct connection is given from the Up Weston line to the Up Fast line, in addition to the route to the W.S. Up line.

Returning to Diagram III., it will be noted that the order of tracks towards Carling Road is (1) Down Fast, (2) Down E.S., (3) Up Fast, and (4) Up E.S., with the goods lines alongside and distinct. From Carling Road to Ashford another series of notable junctions is involved; but these will receive consideration in the next article, and for the present reference may now be made to the lay-out of the terminus as shown in Diagram I.

Here, as already noted, the station is in three distinct sections. Platforms Nos. 1, 2, 3, 4 and 5 connect only with the Up and Down W.S. lines. Any train can be run out and held at the Down Advanced signals (governing the connection from the Underground Railway) and will then clear all up train movements in the station. Similarly spur D will hold a complete train during shunting or exchange movements into or out of the "Middle" station. Spur A is long enough to take a full length car train, or two sections of multiple-unit trains divided for slack hour traffic. B and C are for locomotives only, the latter having connection also with No. 6 platform.

In the "Middle" station Nos. 6 and 7, with the centre road N connect with the Down Fast line, which is, in effect, single

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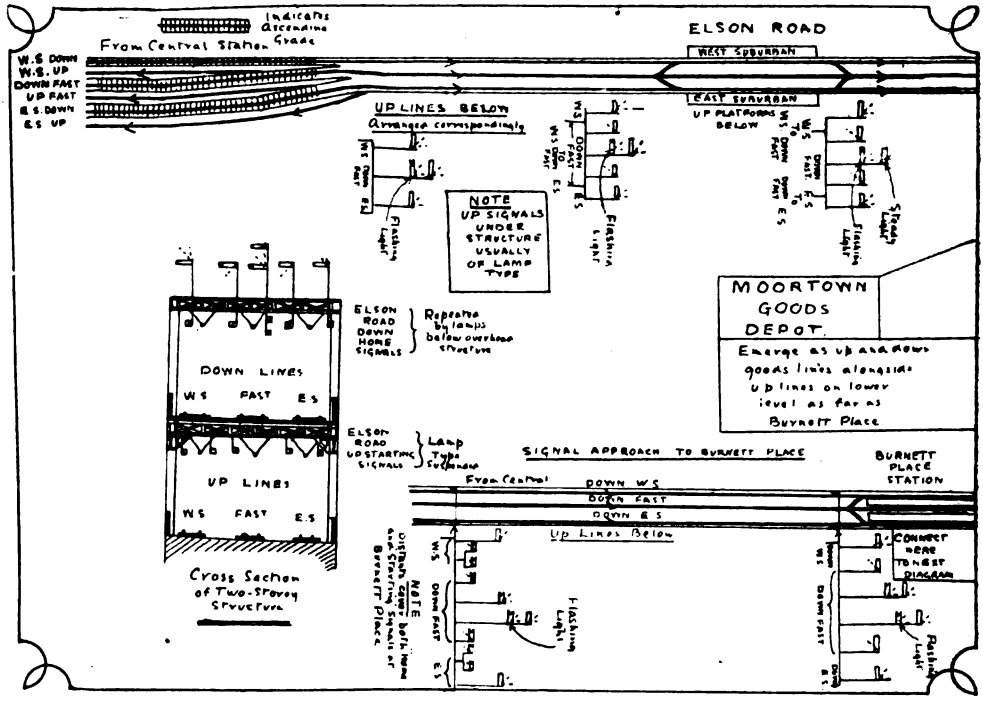
track as far as the Down Advanced signals, controlled for Up trains by the Up Route signals applying to the Up Fast line. Similarly Nos. 8, 9 and 10 connect with the Up Fast line, which is also, in effect, single track to the Down Advanced signals.

Nos. 11, 12, 13, 14, 15 and the milk and parcels platform M connect with the Up and Down E.S. lines. There is sufficient length for a complete train between the divergence of the Up Underground lines and the Up Platform signals. Shunting between 15 and M and the milk platform and spur K need not affect any other lines, while the incidental to so many of the great terminal stations.

In practice the usual allocation of traffic is as follows :—

*Western Station.*

(1) For extra trains.
(2) Alternately (10 minute intervals) Stoneford Junction and Weston or Notbrook locals.
(3) Alternately (half-hour intervals), Johnstone and Chillington trains.
(4) Extra trains for western routes.
(5) As required.




II.—PLAN OF LINES OUTSIDE RAYHAMPTON CENTRAL STATION, WITH CROSS-SECTION OF TWO-STOREY STRUCTURE.

shunting spurs D, E, H provide for interchange requirements, or if need be of removing an up train out of the way for a period to allow another train to occupy the same platform. As the station is at times worked almost to its full capacity this course is sometimes necessary in view of the general practice of using set trains for each service, and of working them to and fro systematically. Such methods also reduce the amount of shunting which is associated with the varied make-up principles which used to be so general, and which largely accounted for the extensive shunting

*Middle Station.*

(6) Through Northern trains.
(7) Marsden Expresses.
(8) Belmont and Seastone Expresses.
(9) Secondary main line trains to Caxton.
(10) Stopping main line trains to Stuart.

In practice these platforms are used without strict adherence to this classification, and both for arrivals and departures. Nos. 6, 7 and 8 will accommodate a shorter main line train behind a standard length train, and trains are sometimes worked in that way. When necessary main line trains are worked

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from No. 4 or No. 5, or from No. 11, transferring to or from the Fast lines at Elson Road or Burnett Place.

*Eastern Station.*

(11) Arklow expresses. These are sometimes run to or from the Middle Station platforms, and to relieve the E.S. Up line it is usual, as far as practicable, to bring up Arklow expresses unto 8, 9 or 10 and transfer at convenience to No. 11 for departure *viâ* Spur H.

(12) Alternately (15 minute intervals) Steynbrook and Mannington locals.

(13) Alternately (15 minute intervals) Albert Park and Notbrook (*viâ* Ashford Junction) locals.

(14) Alternately (15 minute intervals) North and South Bentley trains.

(15) Extra trains.

The standard routes for trains are therefore :—

(*a*) Nos. 1, 2, 3, 4 and 5 to W.S. to Burnett Place and thence W.S. to New Park.

(*b*) Underground to W.S. to Burnett Place and thence W.S. to New Park.

(*c*) Nos. 1, 2, 3, 4 and 5 to W.S. to Burnett Place, thence Down Fast to New Park (Johnstone and Chillington expresses and certain fast business trains).

(*d*) Occasional main line trains from Nos. 1, 2, 3, 4 and 5 W.S. to Elson Road, thence Down Fast.

(*e*) Occasional Underground trains W.S. to Elson Road (for main line Down Fast—and Burnett Place Down Fast to E.S. if required), or Burnett Place to Down Fast to New Park.

(*f*) Nos. 6, 7, 8, 9 and 10 to Down Fast. Transfers at Elson Road or Burnett Place as occasionally required.

(*g*) Nos. 11, 12, 13, 14, 15 and M to Down E.S., with transfers to Down Fast at Elson Road and Burnett Place as required.

Speaking generally, trains on suburban routes are allowed 3 min. to Elson Road and 5 min. to Burnett Place (including stops), so that a Fast train travelling W.S. or E.S. can generally depend upon getting through even to the Burnett Place crossovers without being checked, if running 4 min. behind, or 3 min. if the transfer to Fast lines is made at Elson Road. Speed is limited to 35 miles per hour for all trains between Central and Burnett Place.

It is now necessary to deal with the signalling equipment which, includes several features of interest. It was not until about 1912 that the upper quadrant signal commenced to receive any favour on British railways, while even in 1916 the number of three-position signals could almost be counted on the fingers, notwithstanding the by then wide vogue of upper quadrant signals abroad, and on three-position principles in the United States. Then for a time the upper quadrant system was rather extensively favoured, and a number of three-position installations were carried out, in some instances in connection with "speed-signalling schemes." The "Marsden" Railway, as a developing electric railway, and one requiring automatic signals on the dense-traffic sections, took a leading part in such developments, and for a time was operated exclusively on the upper quadrant system within the Rayhampton suburban area.

The tightening up of express train timings and the gradual development of the running of systematic but more or less independent long distance services favoured the introduction of "speed signalling" equipment along the main routes, so that for the Fast lines through the suburban area, and for the country main lines a system of two-armed three-position signals was developed. At the same time "flashing" lamps were introduced for high-speed direct-route "distants," or rather for the lower arms where the two-arm three-position system was in use.

It was realised, however, that whatever their advantages in regard to power operation, upper quadrant signals did not realise any simplification in respect of indication as compared with lower quadrant practice, except that they were suitable for three-position working, and in that connection rendered "non-splitting" distants unnecessary. There was little to gain by applying "speed-signalling" methods to the local tracks, and there still remained the difficulty of differentiating "splitting" signals as affecting the "distant" indication of three-position arms. In short, it became apparent that the doing away with the old-fashioned "distant" arms rendered it necessary to devise other means for giving a pre-indication of a splitting route ; and that any hard-and-fast system, such as that which had been practicable according to the older systems, could not be continued.

Eventually a compromise was adopted, having advantages of its own, and effecting certain differentiations not previously obtainable, at least readily. Moreover, experience had shown the practicability of mixing upper

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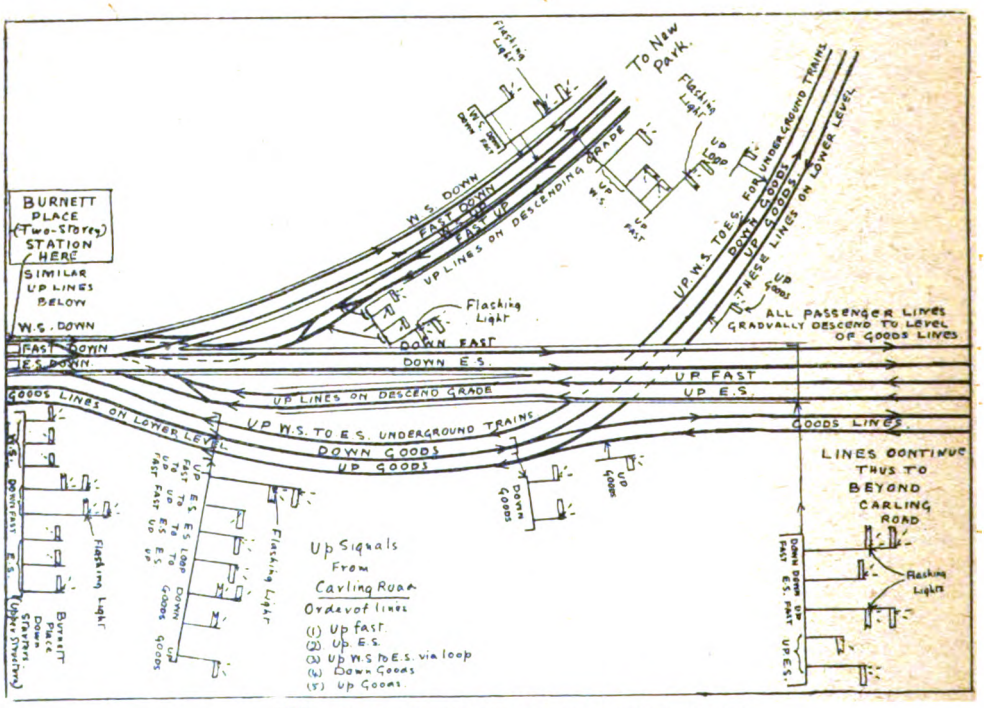
and lower quadrant and ordinary three-position and speed signalling without disadvantage, while it had become equally apparent, that providing there were no risks of misunderstanding on the part of enginemen, it was not absolutely necessary to make everything so peculiarly unmistakable that even a strange driver could never be misled, seeing that a motorman not fully familiar with every signal would not be trusted in charge of a train. Trip and like devices as safeguards were also being introduced even on the high speed main lines, as a necessary corollary to the running of trains by motormen without assistants.

arms together usually cover four sections ahead, the interval from one signal to another being regarded in every case as a section. In a few instances the fourth indication—lower arm vertical—is not given unless there is a sufficient run ahead to allow of ample time for pulling up a fast-running train and allowing for overlap; but in most cases the four-section principle can safely be maintained without variation. In addition the lower arm has a flashing light, so as to be clearly distinctive. In practice a driver runs largely by the flashing green lights, any other indication showing that he has not a clear run before him, or




III.—PLAN OF JUNCTIONS AT BURNETT PLACE.

Therefore the system developed involves the following features :—

(*a*) On suburban and other lines for standard running routes not involving a speed reduction or the passage of a crossover, signals are of three-position upper-quadrant type, the repeating position always applying to the next signal ahead, whatever its designation.

(*b*) On high speed lines the same methods are adopted, always, however, with arms placed high, and in addition to the usual arm a second fishtailed arm is placed below and operated therewith, so that the two

that he has to take a diverging route and his train must be well in hand.

(*c*) All crossover or diverging signals not of equal importance are controlled by "lower-quadrant" arms showing two positions only, and these are pre-indicated by old-type lower quadrant distant arms. Where there is a direct and a crossover route, the former is controlled by the standard three-position arms, and the latter by a two-indication lower-quadrant arm, repeated ahead by a similar "distant." Where desirable such "distants" are placed sufficiently far back to give the required pre-indication of an

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essential signal, and to that extent are "distants" rather than repeaters; but for less-important crossover and like routes no distant is given at all. In such cases the three-position running signals apply only to the direct route and not to the crossover route.

(*d*) In the case of diverging routes of equal importance, or substantially so, the upper quadrant three-position system is retained, with double posts and arms as far back as necessary. Flashing lights are, however, used only for one route, in default of any other distinction, applying to the most important trains.

(*e*) For siding and like purposes multiple-indication signals are used, instead of multiplying arms. Dwarf signals are used to indicate crossovers only concerned with shunting movements.

(*f*) Lamp signals are used in a few places, as for low repeaters of high signals which extend above the overhead conductor supports; and elsewhere as desirable.

The night indications for three-position signals are red, orange and green, duplicated for the lower arm where two are employed for speed signalling. Except for the approaches to principal stations and in sidings, and apart from the high-speed signalling posts, two signals are never placed on the same "doll;" and to differentiate crossover routes (lower quadrant arms) an illuminated casing showing a dull opal square bearing a black ✕ is placed at the base of the post to which it applies, the signal lights being red and green (orange and green at the distant). Where virtually all signals are of this class, as for the approaches to Rayhampton Central station, these indications are omitted. Siding signals have small lights (red and green) and dwarfs are obscured except when off. All signalling is automatic or semi-automatic, and controlled by track circuits.

Referring to Diagram I., it will be noted that every platform has a main departure signal of three-position upper quadrant type, together with one or two smaller lower quadrant two-position arms controlling access to the spur noted, and with openwork X-arms for engine movements. The "Middle" station starters are higher than the others, but no flashing lights or speed signalling arms are installed. As no platform has departure access to more than one running line, one main arm is sufficient in every case, and every other signal about the station is lower quadrant and two-position only. The Down Advance signals are all three-position upper quadrant, but still without flashing lights or speed signalling arms. Midway along Nos. 6 and 7, and interconnecting between Nos. 8, 9 and 10 are crossovers and these are controlled by arms as indicated. The former series are governed from one gantry, the points constituting the fouling places, but the points on Nos. 8, 9 and 10 are of later installation, and two separate sets of signals are used. All these signals are governed by track circuits in the section to which they give access, but may be passed at danger under instructions from platform officials as required in shunting, or when a long train is brought up behind a short one. All up trains entering one of these platforms are required to be ready to stop in the front section, passage further along being on the instructions of the officials, or when the appropriate signal is lowered.

The Up Route signals are all lower quadrant and merely permit of running up to the platform signals, and no previous indication is given of individual platforms. The Up Platform signals apply to all lines to which direct access is given; while the spurs have multiple-route indicators to the platforms concerned, the lights being entirely obscured except when an indication is being given. As no movement in the station may be made except under signal control it is unnecessary for these to show red lights.

Turning to Diagram II. at the summit of the incline to the upper deck of the two-storey structure, the Down Fast line has its first "speed" signal, with flashing light to the lower arm, while the Down W.S. and E.S. lines have single three-position arms. Approaching Elson Road, there are upper-quadrant three-position arms to the W.S. and E.S. lines, speed signalling arms to the Down Fast, and lower quadrant arms for Fast to W.S. or E.S. At the other end of the station there are similar lower quadrant arms from W.S. or E.S. to Down Fast. No distants are given of these diverging signals as speed is still low; but on the continuation to Burnett Place, given on the same diagram, the W.S. and E.S. lines have lower quadrant distants applying to the Burnett Place starters, through one crossover to Down Fast towards New Park and through the other crossover to the main line Down Fast; lower quadrant distants

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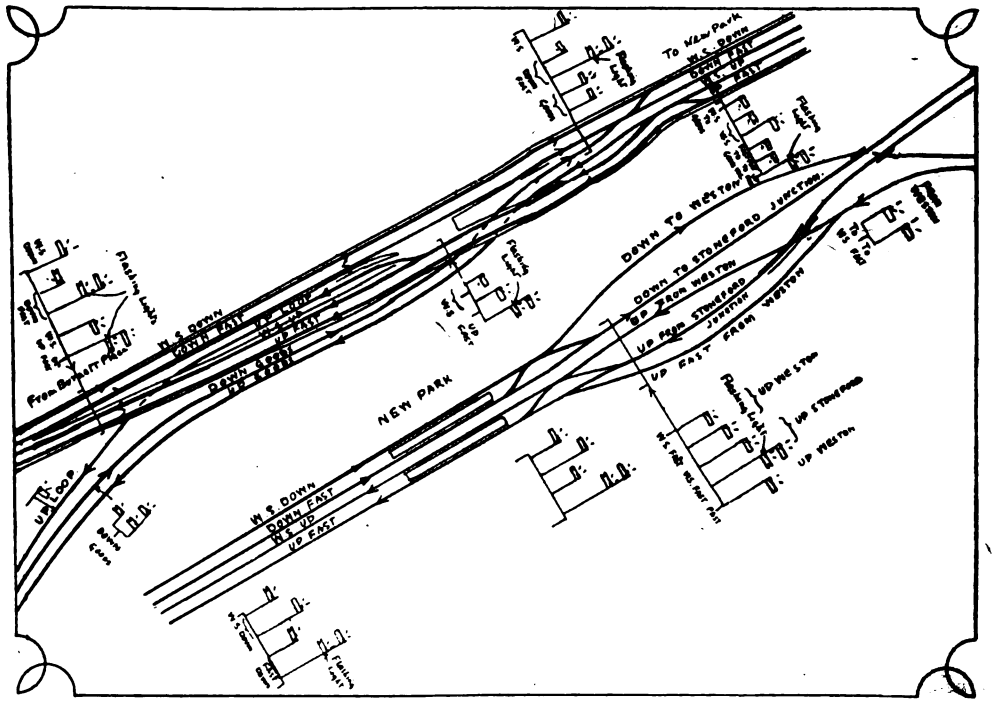
applying to the Down Fast for the crossovers at the approaching end of the station, respectively to the W.S. and E.S. lines, and upper quadrant three-position distants applying to the two main routes beyond the station; but with only one top arm which works with either of the upper quadrant distants, though only that to the main line has a flashing light. The Down E.S. line has its direct three-position signal and two distants for the divergencies beyond the station to the two Down Fast routes.

At the approach to Burnett Place the Down Fast signals are duplicated to accord with the lower arms applying to the respective routes, so as to maintain four section signalling clearly identified in view of the near approach to the actual junction; there are also the crossover signals from Down Fast to W.S. or E.S., but no second distant indication of the crossovers from W.S. and E.S. beyond, these being sufficiently met by the starting signals at the further end of the platforms. The starters provide for the required indications, lower quadrant for crossovers from W.S. or E.S., though the Down Fast routes both have the full equipment of signals, the main line having a flashing light.

Towards New Park the Down Fast has two arms and a flashing light, the Down W.S. only the usual three-position arm; but near the connection of the Up W.S. Loop is a lower quadrant distant in view of the crossover from Down Fast to Down W.S. available at the Goods Junction. There is provided the crossover from Down Fast to Down W.S., but the goods lines have two upper quadrant three-position arms, these being considered as standard running signals to either line.




IV.—PLAN OF JUNCTIONS ON WESTERN LINES.
(*a*) Beyond Burnett Place; (*b*) At New Park.

Similar principles are shown by the Down signals towards Carling Road, while on the goods lines may be noted two three-position junction signals for the respective down routes available.

Approaching New Park three-position arms cover the down starters at the station, and two-position distants the diverging route signals, considered in this case as standard running signals. The Down Fast has the two arms and flashing light in respect of the Stoneford Junction route, the Weston route involving a speed

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reduction even for express trains. The up signals apply as indicated.

Returning to Burnett Place, the up signals at the Goods Junction (Diagram IV.) give lower quadrant arms to the goods connections and the crossover from Up Fast to Up W.S., with a separate distant for the W.S. loop junction. At the latter connection signals are provided as indicated. The next signal gives distants for the crossovers from W.S. to Up Fast and Up Fast to W.S., at the junction control signals.

From Carling Road may be noted a distant for the crossover from Up E.S. to Up Fast, while the next signal gantry covers the Up Fast and Up E.S. lines from Carling Road, the Up Loop from New Park and the goods lines. Other signals need not be described in detail, while the up signals on the lower deck of the two-storey structure are not given. Where necessary signals carried above the supports for the overhead structure are duplicated below by lamps as indicated in Diagram II., while on the lower level they are exclusively of lamp type. In the open country, however, and particularly where simple signal lay-outs are involved, it is found that an effective view can be obtained, notwithstanding the conductor supports, with duplicating arms and lamps installed in particular instances.

In the case of the speed signals which cover the equivalents to four sections (considered as from signal to signal), however short and numerous some of these may be, access is almost invariably indicated through or into one of considerable length, so that a driver receiving a flashing green light is assured of a clear run sufficiently far ahead as to allow of full speed being maintained. In the few instances where strict maintenance of this principle does not apply, the final position is not given unless a further section is clear.

(*To be continued.*)

## SOLDIERS' AND SAILORS' FREE BUFFET AT EUSTON STATION: LONDON AND NORTH WESTERN RAILWAY.

*Photo*] [*Topical.*

We are indebted to our London and North Western Railway contemporary for this illustration, referred to on page 201.



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# British Railway Service and the War. [VI.]

FEELING is particularly strong in regard to the execution of Capt. Fryatt, of the Great Eastern Railway steamship *Brussels*, captured by the Germans on June 25th last. There is no occasion to recapitulate the full story of this tragedy, for such it is; but if a doctrine such as that enunciated by the German Government to justify their action in this matter should ever become general, the world would be in a parlous state. Therefore we will only set forth the official and semi-official statements upon the subject, and in reproducing a portrait of Capt. Fryatt, for which we are indebted to the Great Eastern Railway, the RAILWAY MAGAZINE tenders its sympathy with his wife and family in their bereavement, which has become national as well as personal.

THE LATE CAPTAIN CHARLES FRYATT.
Great Eastern Railway *SS. Brussels.*

A letter was sent to Mrs. Fryatt by command of the King in the following terms:—

Buckingham Palace,
Aug. 3rd.

"Madam, — In the sorrow which has so cruelly stricken you the King joins with his people in offering you his heartfelt sympathy. Since the outbreak of the war His Majesty has followed with admiration the splendid services of the Mercantile Marine. The action of Capt Fryatt in defending his ship against the attack of an enemy submarine was a noble instance of the resource and self-reliance so characteristic of that profession. It is, therefore, with feelings of the deepest indignation that the King learnt of your husband's fate, and in conveying to you the expression of his condolence I am commanded to assure you of the abhorrence with which His Majesty regards this outrage.—Yours very faithfully, STAMFORDHAM."

The following letter was sent by Mr. Harcourt, M.P., from the Board of Trade, to Lord Claud Hamilton, Chairman of the Great Eastern Railway:—

"My dear Lord Claud,—I am writing for Mr. Runciman and myself to express to you and the Great Eastern Railway Company our sense of the loss you have sustained through the death of Capt. Charles Fryatt, the master of the ss. *Brussels*. It is hardly necessary to say what we think of the circumstances attending his death; there can be only one opinion in this country about that. Would you kindly convey to Mrs. Fryatt the sympathy we feel with her in the death of her gallant husband. The Board of Trade are recommending the grant of an additional pension of £100 a year to Mrs. Fryatt over and above the pension to which she and the children are already entitled under the Government compensation scheme."

Lord Claud Hamilton has recommended to the Board of the Great Eastern Railway that an annuity equivalent to the salary of the late Capt. Fryatt be granted to his widow—£250 a year for life. Capt. Fryatt left both his gold presentation watches (that from the Great Eastern Railway and from the Admiralty) with his wife before his last voyage, so that they did not fall into the hands of the Germans. We understand that on neither of the watches is there any inscription indicating that the recipient had even attempted to sink a submarine.

Lord Claud Hamilton, in an interview said: "Capt. Fryatt was always so brave, so capable, and so modest. He began his sea-faring career with the Company as a boy about twenty-five years ago, and has worked his way up on account of his remarkable ability and consistent merit. He leaves a widow and six or seven children. I anticipate that the question of providing adequately for them will be raised in the House of Commons on Monday. The Admiralty may wish to undertake this in the special circumstances. Otherwise it will be the privilege of the Great Eastern Railway to do so."

Mr. H. W. Thornton, General Manager of the Great Eastern Railway, said: "It is difficult to express myself rationally about



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the thing. It is simply another exhibition of that hideous inhuman brutality which has thus far characterised the German conduct of this war. . . . There was absolutely no justification for this latest crime, and it rather looks to me as if it was the insanity produced by the prospect of defeat."

LIEUT. F. A. POPE.
General Manager's Department,
London and North Western Railway.

The Continental Traffic Manager, Mr. C. Busk, stated that Capt. Fryatt entered Great Eastern Railway service in 1872 as an able seaman, and became a captain in 1913. . Since the commencement of the war he had made nearly a hundred voyages—seventy-seven to be correct—between Harwich and Rotterdam, and Tilbury and Rotterdam. He was courageous as a commander, and several times eluded the German submarines.

The movement in favour of War Savings Certificates has been supported by railways, and on most lines notices were issued setting forth arrangements provided to meet the circumstances of employés. As an example, that issued by Mr. C. L. Edwards, Accountant Great Northern Railway, may be quoted:

"The Directors of the Company have approved facilities granted to enable all employés of the Great Northern Railway to subscribe to and purchase War Savings Certificates. With this object a form of application has been provided for such subscriptions to be deducted through the channel of the weekly paybills. To enable an employé to obtain War Savings Certificates, which cost 15s. 6d. each, and for which £1 will be paid five years after the date of issue by His Majesty's Treasury, an application should be forwarded to this office not later than Friday, July 28th, stating which of the following schemes it is proposed to adopt. In no case will deductions be continued for a period exceeding sixteen weeks."

The various schemes were then set out in detail, and in conclusion it was stated that "War Savings Certificates will be purchased by the Company, on behalf of each subscriber, when the applications are received, without waiting for the full amount to be subscribed, so that each certificate will bear interest some weeks in advance of the final payment. Attention is drawn to the fact that the money lent to the State by this method is not locked up for a period of five years, because the certificates can be cashed at any time. During the first year they can be cashed for 15s. 6d.; at the end of twelve months they can be cashed for 15s. 9d., and thereafter the cash value increases by 1d. per month, so that anyone who lends money by this method can have it back again whenever necessary by application to any post

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office. No income tax will be payable. It is suggested that this method of lending to the State will appeal to the staff, and secure a response from all departments on the Great Northern Railway."

Sergt. P. S. Williams, Surveyor's Department, Great Northern Railway, has been promoted to the rank of second lieutenant in the Royal Flying Corps. War was declared on August 4th, 1914, and Mr. Williams enlisted as a mechanic in the Royal Flying Corps on the 8th, and joined the British Expeditionary Force in France on the 11th.

We regret to announce that Capt. the Hon. W. Roland Erasmus Philipps, surviving son and heir of Lord St. Davids, was killed in action on July 7th. Capt. Philipps received a commission in the Royal Fusiliers at the outbreak of war, and he had been at the front for more than a year. In April last he was awarded the Military Cross. His elder brother, Capt. the Hon. Colwyn Philipps, Royal Horse Guards, was killed in May, 1915.

A portrait is reproduced of Lieut. F. A. Pope, who enlisted, from the General Manager's Office, London and North Western Railway, as Assistant Military Forwarding Officer in connection with the Railway Transport Corps. He has served Rail-Head near Ypres, and also at Rouen, and is now at Salonica.

The Distinguished Conduct Medal has been awarded to Sergt. Oswald Davies, who has recently left the Wilts. (Fortress) Engineers at the expiration of the required period of service and resumed his former duties as a locomotive engine fitter in the Great Western Railway works at Swindon. He is 39 years of age and had been in the service since 1892. The heroism by which the Medal was gained was displayed by Sergt. Davies in repairing a bridge under heavy shell fire on the Yser Canal, Ypres, in May, 1915.

Lieut. Horace B. Smith, R.N.R., eldest son of Mr. A. G. Smith, Office Assistant to the Great Western Railway Chief Engineer, has been awarded the Distinguished Service Cross in respect of gallant and successful patrol duty in the North Sea, under extremely hazardous conditions of weather and exposure to enemy attack and mines. Lieut. Smith was at one time a member of the staff of the Superintendent of the Line. He is 28 years of age and in command of H.M.S. *Veresis*.

Sergt. Leo M. Sharp, son of Capt. R. Sharp, of the Great Western Railway Marine Department, Fishguard, has been awarded the Distinguished Conduct Medal. Prior to the war he was a fitter's apprentice in the marine factory at Fishguard, and in civil life had gained the Royal Humane Society's Vellum for an attempt to save life. On the outbreak of war he joined the Royal Engineers and was rapidly promoted to his present rank.

Corpl. E. Rudd, 1 18th Batt. Middlesex Regiment (T.), who was a clerk in the Great Western Railway Goods Department at Southall, has been mentioned in despatches for meritorious conduct.

Lance-Corpl. G. Broadhurst, of the 10th South Wales Borderers, who, prior to the outbreak of war, was employed as a packer at Portskewett, has been awarded the Albert Medal of the First Class, in recognition of his gallantry in saving life. On February 10th, whilst a number of men were being instructed in bombing, one of them accidentally dropped a live bomb, picked it up again, and in his excitement threw it into a corner of the room in which other men were assembled. Broadhurst immediately placed his foot on the bomb, with the object of minimising the effect of the explosion. He was severely wounded in both feet, but his brave action undoubtedly safeguarded his comrades.

In the *London Gazette* of July 25th, under the head of "Oversea Contingents—Canada —Can. A.S.C.," it was notified that Staff-Sergt. Harry Leslie Petrie is promoted to be temp. lieutenant, to date from the 8th inst. Trained in the first place at Valcartier (Quebec), he came over with the first Canadian contingent and completed his training on Salisbury Plain. He has been 18 months with his regiment in France and Flanders. Lieut. Petrie is a son of Mr. J. J. Petrie, Traffic Manager, Midland and Great Northern Joint Railways.

Mr. H. H. Grindley, son of the Indoor Assistant to the Superintendent of the Line, London and North Western Railway, who before the war was one of the Assistants to the District Superintendent at Liverpool, joined the 4th Brigade, West Lancashire R.F.A. (T.F.) (Howitzer), in September, 1914, in which he holds a commission as Lieutenant. In March, 1915, he was seconded to the Railway Transport Service and was sent to France as a Railway Transport Officer. In November, 1915, he went to Salonika, where he now is. He has recently been promoted to the rank of Staff Captain.

The War Seal Foundation Committee has, by permission of the Great Western Railway, arranged for the sale of "war seals" at different stations on the system. The sale

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has been undertaken by many of the station-masters and members of the staff, and the seals are sold at ½d. each; the use to which the seals are put is to affix them to letters sent through the post. The aim of the Foundation is to provide mansions, comprising self-contained flats, for disabled service men, so as to enable them to live on their pensions. The flats will be let at nominal rents, inclusive not only of rates, taxes, etc., but also of medical care and physical attention appropriate to every case.

An entertainment room for the residents will be situated in the centre of the administrative block of each mansion and be accessible, under shelter, from every flat, and the residents will be entitled to use the room. The balconies, passages, and lifts will be so constructed as to enable the totally disabled to be taken there without discomfort. Heat baths will be at the disposal of the men suffering from rheumatism, etc., and faradism and galvanic treatment will be obtainable. Massage will be administered to prevent further wasting of paralysed limbs, and there will be a sulphur bathroom. The Foundation have agreed to ear-mark the moneys obtained by the agency of the Great Western Railway staff, to provide accommodation for this Company's employés disabled in the war.

We are indebted to our London and North Western Railway contemporary for the illustration reproduced on another page showing the Soldiers' and Sailors' Free Buffet at Euston station. Here more than 1,000 soldiers a day on an average are served with a cup of tea or coffee, with sandwiches or other light refreshments. On Fridays, when men are coming home on week-end leave, the number rises to 1,700 or 1,800. In the 18 months of its existence the Buffet has served more than half a million soldiers. From 8 o'clock in the morning till midnight, and often long past that hour, the staff is busy ministering to the comforts of the soldiers.

The cost of running the Buffet is from £130 to £160 a month, and funds are urgently needed for its continuance. Everything is provided free for the soldiers, but they are generous in the offerings dropped into the contribution box. Warworn troops home after a long spell at the Front and flush of funds have sometimes to be restrained from too reckless generosity, but 2s. or 2s. 6d. is frequently dropped into the box by a "Tommy." On an average the box yields £35 to £40 a month.

LIEUT. H. J. HILL, R.E.
Electrical and Telegraph Department, London and North Western Railway.

Contributions may be sent to Viscountess Churchill at 44, Grosvenor Gardens, or to Mrs. Hugh Ponsonby and Miss Feuerheerd at the Curzon Hotel, Mayfair.

The honour of being mentioned in despatches by General Sir Douglas Haig for good work done in the field has fallen to Lieut. H. J. Hill, R.E., who, before joining the Army, held an important post in the Electrical and Telegraph Department of the London and North Western Railway. Lieut. Hill began his career in the Engineer's Department at Stafford 18 years ago, and his earliest duties were connected with the widening of the line between Stafford and Milford. On the completion of that important undertaking, he was transferred to Stockport, and, later, was stationed at Chester. Returning to Stafford nine years ago, he was transferred to the Telegraph Department, and later became Assistant District Engineer. Mr. Hill was gazetted 2nd Lieut., Royal Engineers, June 12th, 1915, and on July 15th sailed for France. In October, 1915, he was promoted full Lieutenant, and has been on active service ever since.

2nd Lieut. Hudleston, of the London and North Western Railway Solicitor's staff at Euston, was killed in action July 2nd, 1916. At the outbreak of war he joined the Golder's

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2ND LIEUT. HUDLESTON.
Solicitor's Department,
London and North Western Railway.

Green Volunteer Training Corps and the Special Constabulary, and he became subsequently a member of the Anti-Aircraft Corps. He obtained permission to enlist, and on April 22nd, 1915, left the North Western to join the Inns of Court O.T.C. In a remarkably short time he made himself efficient, and on June 23rd, 1915, he was gazetted to the 14th Battalion Middlesex Regiment. He was placed on the list of officers who were certified as being ready for foreign service, and two months ago the call came and he left for the Front with a draft of officers, and was attached to the 12th Battalion of his Regiment.

Lieut. Clacy W. P. May, R.F.C., has been awarded the Military Cross for destroying a kite balloon while under fire. He is eldest son of Mr. William C. May, Chief Traffic Manager, Great Eastern Railway.

Cadet Wilfrid Frank Antill, of the 21st (Public Schools) Battalion, Royal Fusiliers, has been gazetted Temporary Second Lieutenant, West Yorkshire Regiment. Prior to joining the Colours, in September, 1914, Lieut. Antill was a member of the staff of the Chief Goods Manager, Midland Railway, Derby.

Lieut. James Bansall Evans, of the Public Schools Battalion, Royal Fusiliers, was killed in action at the head of his men on July 20th. Thirty-one years of age, he was educated at the Wyggeston School, Leicester, and joined the Public Schools Battalion as a private in September, 1914. He was offered and accepted a commission in his own battalion in March, 1915, promoted to First Lieutenant early this year, and has been fighting in France since November last. Lieut. Evans was the youngest son of Mr. Thos. Evans, District Goods Manager, Midland Railway, Liverpool and Manchester districts.

Lieut. H. A. Holmes, of the Royal Fusiliers, who has been rather badly wounded in the recent heavy fighting on the Western Front, and is now in hospital in London, is the second son of Major Holmes, M.V.O., Superintendent of the Line, London and South Western Railway.

An appropriate method of celebrating the second anniversary of the declaration of war was adopted by the London, Brighton and South Coast Railway. A large number of the staff were invited by the Earl of Bessborough, K.P., Chairman of the Company, to attend the general meeting-room at 12 o'clock on August 4th, to join in the singing of the National Anthem.

Lord Bessborough said: "Last year, on the anniversary of the outbreak of war we met in this room to sing together 'God Save the King,' bearing in mind our friends at the Front. We assemble on the second anniversary of the war in a far different frame of mind than we did last year. You all read of our great efforts as well as the military efforts of our great Ally, France, and of our other Allies, Russia, in particular, who are all winning victories, and are all perfectly confident of the decisive end and victorious days for the country and King we all serve. . . . Our own workers here have all shown loyalty during the two years that we have been at war. We have sent 3,406 of our colleagues to the Front, and of these 304 are wounded, 162 have fallen on the Field of Honour, and 30 are prisoners of war."

The National Anthem was sung with fervour, and three cheers were given for the King and his Allies. Lord Bessborough continued: "I only hope that when this day year comes we can assemble here to sing 'God Save the King,' and give three cheers for our King and country and for a glorious peace."

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# The Selsey Tramways.

BETWEEN Bognor and Portsmouth is the promontory known as Selsey Bill, and to connect the fishing and holiday village of Selsey with the Portsmouth line of the London, Brighton and South Coast Railway at Chichester a little railway, 8 miles long, was opened for traffic August 27th, 1897. This line rejoices in the official title of "The Hundred of Manhood and Selsey Tramways," usually shortened to the two last words.

*Photo]* [*W. P. Marsh & Son, Chichester.*

TRAIN ON BANK THROUGH PAGHAM HARBOUR.

This line is really of Light Railway character, but conveys a considerable volume of traffic. In a normal summer as many as 26 trains may be run daily, but in the ordinary way, and under present conditions, seven each way and an additional one on Thursdays suffice, though frequently fully loaded. There are four intermediate stations, Hunston, Chalder, Sidlesham, and Ferry, with two or three halts, one serving a farmhouse and ranking as a private station, and another for the Selsey Golf Links. Speaking generally, the line follows the contour of the country, which is substantially flat, and several roads are crossed on the level. As originally built, the line near Sidlesham crossed an area of reclaimed land bordering upon Pagham Harbour, but in 1910, during a great storm, the protecting dyke gave way, with the result that a portion of the railway was submerged. Consequently this section had to be rebuilt on an embankment, some 12 ft. above the old level, and is now carried in this way over a wide expanse of water, which lends scenic interest to a journey, though it entailed great difficulties upon the resources of this little railway at the time of the irruption.

Trains are usually made up of from two to four tramcars of semi-open type, one having a "saloon" compartment which ranks as first class. Tickets are issued by a travelling



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conductor, the "saloon" excess being 3d. per journey. The sets are composed, one of three cars with which a box van works for conveying luggage; the other of four cars, one of which has a brake van compartment. Occasionally one or more goods wagons are also conveyed, though as far as possible this traffic is reserved for the "mixed" train, by which passengers can also travel, leaving Selsey at 10 a.m. and Chichester at 11 a.m. There is exchange siding connection with the goods yard of the London, Brighton and South Coast Railway at Chichester, though the passenger stations are a short distance apart.

Station buildings are, as might be expected, somewhat primitive, but they suffice for the traffic requirements. At Selsey the offices of the Company are combined with the station buildings. Just beyond the station are the engine and carriage sheds, with small workshops and stores. Originally the line was built right through to the beach at Selsey, though rather away from the town, but this section is not now utilised.

Rolling stock includes 3 locomotives, 7 passenger carriages, and 23 goods vehicles. One of the engines is a neat little 2–4–2 side tank engine, built specially for the opening of the line. This is named *Selsey*, and is resplendent with brass dome and other adornments; but apparently the engine which is most appreciated is a 0–6–0 saddle tank engine named *Sidlesham*, of contractors' type. These two engines are used turn and turn about, except that at holiday periods it is sometimes necessary to use both, two trains being then made up, crossing at Sidlesham and controlled on the staff system, with flagmen installed at Sidlesham, there being no ordinary signals on the line. At other times the line is worked with "one engine in steam." The third locomotive is an old 0–4–2 saddle tank engine, in process of reconstruction.

The usual allowance for stopping trains is 30 min. for the 8 miles between Chichester and Selsey, but the mixed trains are allowed 40 min., while two down trains call only at Sidlesham, and thus gain a few minutes. On Sundays there are four trains each way.

By connections with Brighton Company's trains *viâ* Chichester, Selsey obtains good facilities from London, as well as from Portsmouth and Brighton, *viâ* this interesting line. The best service is by the 4.50 p.m. from London Bridge, by which Selsey is reached at 7 p.m. Travelling by the 8.30 a.m. from Selsey, London Bridge is reached at 10.54 a.m. The 12 noon from Selsey gives an arrival at Victoria at 2.35 p.m. On Sundays by the 9.0 a.m. from Victoria Selsey is reached at 11.50 a.m., while by the 5.20 p.m. up the arrival at Victoria is 7.56 p.m.

Selsey is a pretty and unconventional resort, in great favour with the legal fraternity, and with people who reside there during the season, *paterfamilias* dividing his time between London and Selsey. There are beautiful sands, on which special sports such as sand yachting and the like are often conducted. Bathing is good, the golfer is provided for by the links adjoining the village, and there is plenty of fishing, Selsey being a centre of the fishing industry, as well as favoured in this respect by the amateur. Sidlesham, also, is an interesting and picturesque village. Forty years ago this village boasted a considerable fishing industry, and there was a considerable shipping traffic to and from the old tidal mill. The closing of Pagham Harbour in 1878 deprived the village of these advantages. The storms of December, 1910, however, again made Sidlesham what it formerly was, a waterside village, and to-day the fishermen's boats are again seen on Pagham Harbour, and yachtsmen are already taking advantage of the excellent facilities offered them for their sport.

For the past ten years Mr. H. G. Phillips, whose training ground was the valuable one afforded by Southampton Docks, London and South Western Railway, has been responsible for the management of the Selsey Tramways. Mr. H. F. Stephens, who now holds the rank of Lt.-Col. Commanding Kent (Fortress) Royal Engineers, and has done so much for the small railways of England and Wales, is responsible on the engineering side.

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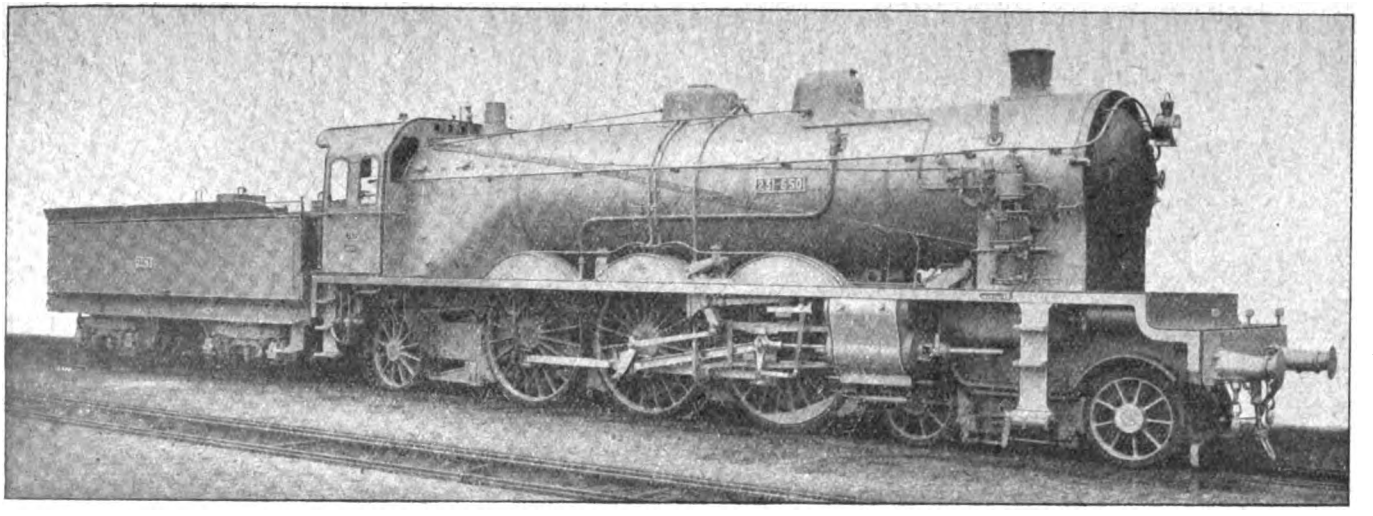
# British-built 4–6–2 and 2–8–0 Locomotives for the French State Railways.



4–6–2 FOUR-CYLINDER COMPOUND PASSENGER LOCOMOTIVE: FRENCH STATE RAILWAYS.
Built by the North British Locomotive Co., Ltd., Glasgow.

IN order to meet the conditions created by war a number of locomotives are being constructed in British railway works for railways of allied nations, and illustrations are now given of two notable classes constructed by the North British Locomotive Co., Ltd., for the French State Railways. These engines are further interesting in that they are built to French drawings, and are similar to classes already in service, except for minor developmental features.

The "Pacifics" are four-cylinder compounds; the "Consolidations" have two cylinders only. Both include Walschaert valve gear and usual French fittings and appliances.

In the passenger engines the high-pressure cylinders are outside the frames, and the connecting rods drive on to the second coupled axle. These cylinders are provided with piston valves and with a "by-pass," which is actuated by pneumatic gear coupled to the regulator handle. The low-pressure cylinders are inside the frames, and their connecting rods drive on to the front coupled axle. The valves of the high-pressure cylinders are of the piston type, whilst those of the low-pressure cylinders are flat slides. In the case of the low-pressure cylinders intercepting valves, actuated by hand-operated pneumatic gear, are provided to allow of the low-pressure cylinders being worked at low speeds with high-pressure steam.



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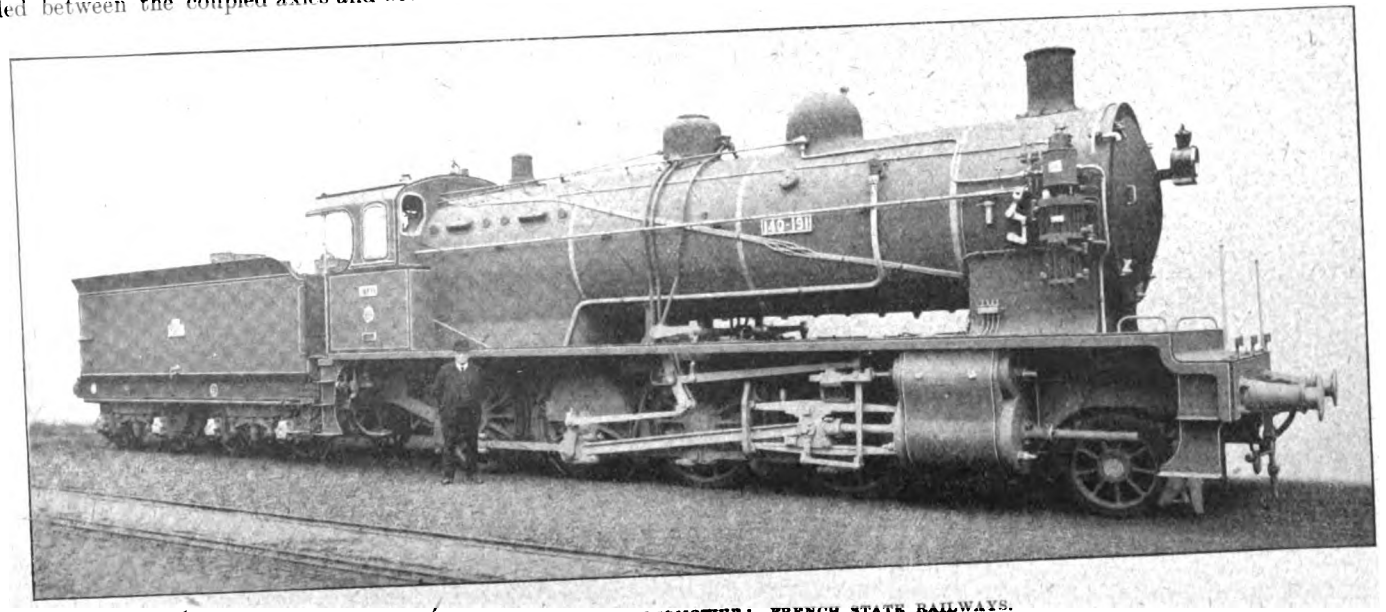
The boiler has a barrel 5 ft. 9¼ in. in diameter outside at the back ring, while the length between tube-plates is 19 ft. 4½ in. The firebox shell is 10 ft. 2 in. long at the bottom, 3 ft. 11⅝ in. wide at the front end, and 6 ft. 10⅝ in. at the back. The roof of the firebox shell is of the "round-top" pattern, and is directly stayed to the crown of the inside firebox by screwed stays. The inner firebox is of copper and the stays are also of copper, except above the firebrick arch, where they are of a manganese alloy. The boiler tubes are of solid drawn steel, and the firegrate is of the finger-bar or rocking-bar type, and is made with a drop section at the front end.

Bearing springs are under-hung, and compensating beams are provided between the coupled axles and between the hind axle and the trailing truck. The tender has a tank capacity of 4,840 gallons and carries 5 tons 18 cwt. of coal.

In the goods engines the connecting rods drive the third pair of coupled wheels. The cylinders are fitted with piston valves, and are also provided with a by-pass which is operated by a pneumatic cylinder and directly controlled by the regulator. Piston rods and tail rods are fitted with United States air-cooled packings. The truck is of the Zara type.

The boiler has a barrel 5 ft. 7⅜ in. diameter inside at the front end, and 14 ft. 9¼ in. long between tube plates, and is fitted with the Robinson superheater, this being the first instance, as far as we are aware, where this superheater has been fitted to what is virtually a Continental locomotive.



2-8-0 SUPERHEATER LOCOMOTIVE: FRENCH STATE RAILWAYS.
Built by the North British Locomotive Co., Ltd., Glasgow.

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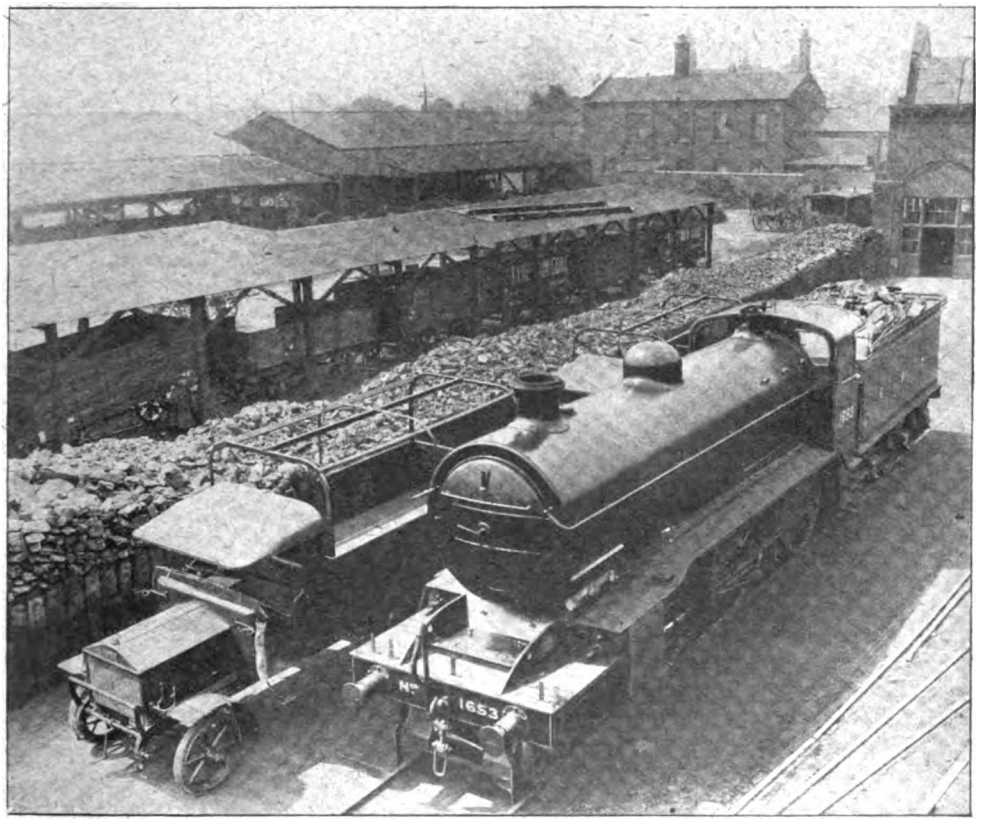
Leading dimensions of these locomotives are as follows:—

| | 4-6-2 | 2-8-0 |
|---|---|---|
| Cylinders | 16½ in. × 25 9/16 in. / 25 9/16 in. × 25 9/16 in. | 23½ in. × 25 9/16 in. |
| Coupled wheels | 6 ft. 4¾ in. | 4 ft. 8 11/16 in. |
| Leading wheels | 3 ft. 7 13/16 in. | 2 ft. 9½ in. |
| Trailing wheels | 4 ft. 0¾ in. | —— |
| Coupled wheelbase | 13 ft. 5 7/16 in. | 16 ft. 8 13/16 in. |
| Engine ,, | 35 ft. 9 3/16 in. | 24 ft. 11¼ in. |
| Steam pressure | 227 lbs. per sq. in. | 170 lbs. per sq. in. |
| Heating surface, large tubes | 598 sq. ft. | 456 sq. ft. |
| ,, ,, small tubes | 1,507 ,, | 1,191 ,, |
| ,, ,, firebox | 177 ,, | 182 ,, |
| Total | 2,282 ,, | 1,829 ,, |
| ,, ,, superheater | 683 ,, | 394 ,, |
| Total | 2,965 ,, | 2,223 ,, |
| Grate area | 45·9 ,, | 34 ,, |
| Weight of engine in working order | 95 tons 0 cwt. 2 qrs. | 64 tons 19 cwt. |
| Weight of tender loaded | 51 tons 13 cwt. 2 qrs. | 44 tons 6 cwt. |

## "PARTNERS OR RIVALS": A GREAT NORTHERN RAILWAY OBJECT LESSON.




A NAPIER 3½-TON MOTOR VAN ALONGSIDE GREAT NORTHERN RAILWAY 2 6-0 ENGINE NO. 1653.

MESSRS. D. NAPIER & SON, LTD., send a unique photograph, taken from a semi-bird's eye position, showing one of the latest type Great Northern Railway express goods engines (2-6-0 type), taken alongside two Napier 3½-ton vehicles. The two models shown are two of the well-known 3½ ton Napiers, which are actively engaged on Government work for the Allies. They represent the last word in motor business vehicle construction.

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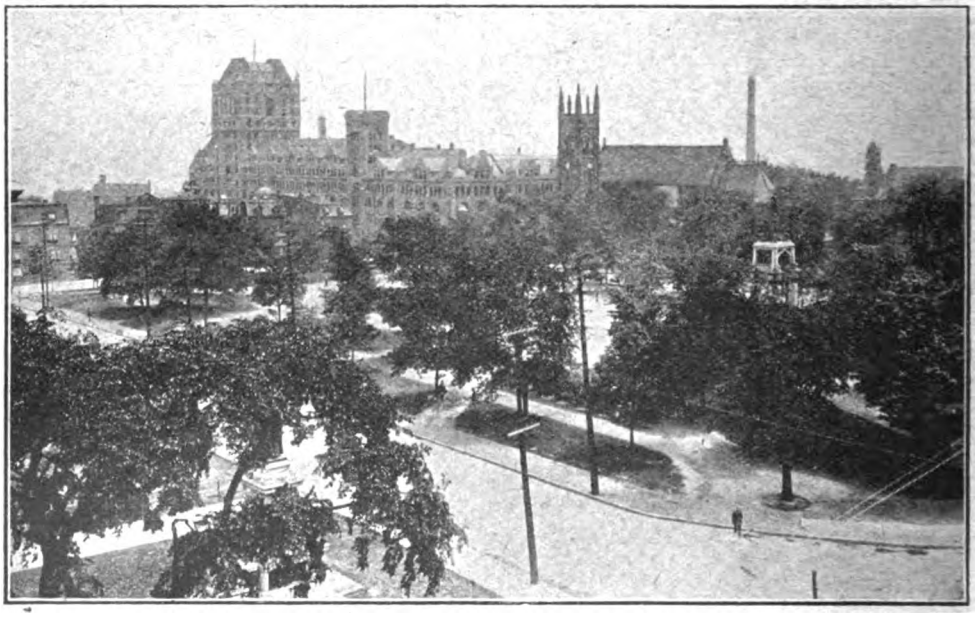
# Thirty Years of Progress:

## THE CANADIAN PACIFIC RAILWAY, 1886–1916.

ON June 28th, 1916, thirty years elapsed since the first through train left Montreal for Vancouver over the Canadian Pacific Railway. This started from the old Dalhousie Square station in Montreal, not now used for passenger purposes, having long been superseded by the modern Place Viger station, adjoining the Place Viger Hotel, and by the splendid Windsor Street Terminal, which is claimed to be the finest station and general railway office building in Canada.



WINDSOR STREET STATION, MONTREAL: HEADQUARTERS OF THE CANADIAN PACIFIC RAILWAY.

The mileage of the Canadian Pacific Railway as shown in traffic returns at the close of 1886 was only 4,651½ miles. Now it is 12,917; and in addition, the Company controls other railway lines whose mileage amounts to 6,151 or a total of 19,068. Gross earnings for the fiscal year ending December 31st, 1886, were only $10,081,803—in five years they had more than doubled, being for the year ending December 31st, 1891, $20,241,095. Since that time they have increased until $100,000,000 has been greatly exceeded—and this does not include the controlled lines.

In 1886, the Company possessed no steamships except three on the Great Lakes. The next year a Trans-Pacific service was established between Vancouver, China and Japan with the three chartered steamships *Abyssinia*, *Batavia*, and *Parthia*, and four years later, in 1891, the first of the three Empresses—the *Empress of India*—made her first voyage from Hong Kong to Vancouver. Now, the segregation of the Canadian Pacific Atlantic and Pacific Ocean Steamships into the "Canadian Pacific Ocean Services Limited," at the beginning of the present year, has established one of the strongest steamship organisations in the world, and, in addition, the Canadian Pacific Railway operates fleets of speedy and luxurious vessels on the Bay of Fundy, the Great Lakes, the Kootenay, Arrow and Okanagan Lakes and on the British Columbia Coast.



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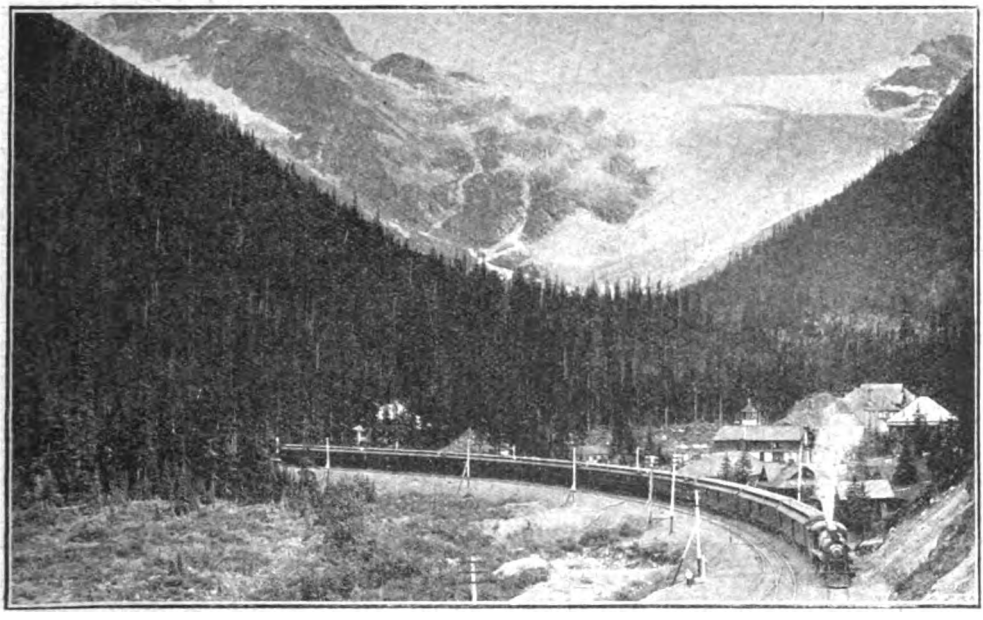
A comparison of the equipment possessed by the Canadian Pacific Railway at the close of 1886 and for the last fiscal year ending June 30th, 1915, is interesting.

| | 1886 | 1915 |
|---|---|---|
| Locomotives.. .. .. .. | 372 | 2,255 |
| First and second-class passenger cars, baggage cars and colonist sleeping cars .. .. .. | 304 | 2,182 |
| First-class sleeping and dining cars | 47 | 502 |
| Parlour cars, official and paymaster cars .. .. .. .. | 27 | 97 |
| Freight and cattle cars (all kinds).. | 8,253 | 87,504 |
| Conductors' vans .. .. .. | 178 | 1,424 |
| Board, tool and auxiliary cars and steam shovels .. ... .. | 71 | 6,467 |

carried across the plains of Manitoba, Saskatchewan and Alberta, as he climbs the Rockies and Selkirks and, through the canons of the Thompson and Fraser Rivers, is transported with speed, safety and comfort to the British Columbia Coast, cannot help but be impressed by the thought that, where he now sees farms and fruit orchards, thriving villages, prosperous towns and busy cities, there was thirty years ago practically nothing, and in this great change the Canadian Pacific Railway has been very prominently associated.

Last month a review was given of Mr. Keith Morris' book entitled "The Story of the Canadian Pacific Railway," price 3s. 6d. net;



TRANS-CONTINENTAL EXPRESS AT GLACIER, BRITISH COLUMBIA.

The growth in the Canadian Pacific's mileage, its equipment and its earnings are coincident with the development of Canada, and Canadian development has been largely associated with the opening of the Canadian Pacific Railway and the extension of its lines.

The traveller across the continent, as he is

and we are indebted to the publishers, Messrs. William Stevens, Ltd., of Henrietta Street, Covent Garden, London, W.C., for the two illustrations reproduced therefrom. A description of Windsor Street station, Montreal, was included in the February, 1916, RAILWAY MAGAZINE.

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## ULVERSTON.

**A notable Station on the Furness Railway.**

*Top Photo:*
DOWN PLATFORM.

*Centre Photo:*
GENERAL VIEW.

*Bottom Photo:*
VIEW SHOWING CLOCK TOWER.

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# PERTINENT PARAGRAPHS

## A Record Run on the North British Railway.

RECENTLY a private soldier in Edinburgh received a telegram requesting his immediate presence at his home in the south-west of England. Unfortunately, it was received just too late to enable him to catch the 10.30 a.m. Midland train from Edinburgh, Waverley. But he was determined to get forward to Carlisle so as to go south from there by the 1.38 p.m. train, which is a continuation of the 10.30 a.m. from Edinburgh. He requisitioned a special train from the North British Railway, and it left Waverley at 11.58 a.m., reaching Carlisle at 1.43. The 1.38 p.m. from Carlisle was detained till the arrival of the special.

As certain contradictory statements have been published, the following authentic particulars, for which we are indebted to Mr. J. Black, Superintendent of the Line, will be of interest. The train consisted of an engine of the 4-4-0 class, 2nd degree, No. 487M, and a Midland brake composite. The following is a log of the run :—

| M. | CH. | | | A.M. | Mins. between points shown. |
|---|---|---|---|---|---|
| — | | Waverley | .. leave | 11.58 | .. |
| 17 | 76 | Falahill | .. pass | 12.20 | 22 |
| 15 | 47 | Galashiels | .. ,, | 12.35 | 15 |
| 19 | 24 | Hawick | .. arr. | 12.53* | 18 |
| — | | ,, | .. leave | 12.57* | 4 |
| 10 | 68 | Whitrope | .. pass | 1.10 | 13 |
| 10 | 22 | Newcastleton | ,, | 1.21 | 11 |
| 24 | 18 | Carlisle | .. arr. | 1.43 | 22 |

Stopped at Abbeyhill Junction, 11.59 to 12.0, signals.

Slowed, signal check, Hawick North.

* 4 min. delayed, Hawick station, by signal check.

Slowed between Scotch Dyke and Longtown by engineer's operations.

Even with so light a load, estimated at 25 tons, this was a notable run, and is easily a record for the difficult Waverley route, whose curves often preclude such fast running as would otherwise be practicable. As it was, the 98 miles 15 chains were covered in 105 min., or, allowing for stops and checks, in even time throughout.

## Strawberry Traffic.

SOME years ago a comprehensive article was published in the RAILWAY MAGAZINE dealing with the Hampshire strawberry traffic; but in a recent issue the *Railway News* included a statistical article to which some reference may be made as amplifying ours. The fruit belt adjoins Southampton Water, and it is the southern climate which enables the growers to produce early fruit and so obtain the highest prices in the London and other markets. During the 1915 season over three millions of baskets were forwarded by rail, this being the largest number conveyed in any year by the London and South Western Railway, which serves the fruit area. The Kent, Wisbech and Evesham strawberries are usually from 10 to 14 days later than those grown in Hampshire.

The picking season commences early in June, and lasts about five weeks. During the first week the fruit is sent in small quantities only, and is conveyed by ordinary passenger trains. As it increases special fast fruit trains for Scotland and Ireland; Yorkshire, Lancashire, Durham, etc.; Liverpool, Manchester, and the Midlands; Bristol and South Wales; Bournemouth, Weymouth, etc.; and to London are run and the ordinary trains are prohibited from conveying fruit.

Branch trains are also run in connection with these services, which are put into operation as and when required. The average time occupied in loading and dispatching a train of 25 vehicles containing about 20,000 baskets is one and a-half hours.

## Some Notable Statistics.

The three million baskets which were put on rail during the 1915 season were distributed as follows :—

| | |
|---|---|
| London .. .. .. .. | 847,586 |
| South Wales .. .. .. | 426,264 |
| Midland Counties .. .. | 259,474 |
| Yorks., Durham, etc. .. .. | 241,993 |
| Scotland .. .. .. .. | 196,224 |
| Manchester .. .. .. | 192,977 |
| Lancashire .. .. .. | 188,498 |
| Liverpool .. .. .. .. | 129,661 |
| Sussex .. .. .. .. | 58,947 |
| Ireland .. .. .. .. | 57,236 |
| Various .. .. .. .. | 411,334 |
| Total .. .. .. | 3,010,194 |

The principal fruit-sending stations are Swanwick, Botley, Bursledon, and Wickham. Swanwick takes the lead, and during the 1915 season broke its own and all other stations' records. On June 21st of that year 126,004 baskets were forwarded in 141 vehicles, and the total number of baskets for this station for the season was 1,648,024.

The London and North Western, Great



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Western, Midland and Great Central Railways send inspectors to Swanwick, Botley and Bursledon to advise the London and South Western staff in regard to loading tranship and other vans.

As showing how small a factor in the cost to the consumer are the expenses of railway transport, it is pointed out that the fruit is carried by special fast trains to London (77 miles) at a sixth of a penny, to Manchester (230 miles) at a halfpenny, and Inverness (600 miles) at three farthings per lb.

### Strawberry Season, 1916.

THE season 1916 has been an exceptionally good one so far as the strawberry traffic over the London and South Western system is concerned, the fruit in the Botley and Fareham districts having been very plentiful and of good quality. This year the season practically closed on July 15th, and the following is a *résumé* of the work, which was carried out under difficulties in consequence of the exigencies of the war and the depletion of the Company's staff. These figures were given by Mr. A. C. Holmes, Assistant District Superintendent, Central District, at a friendly gathering of the staff held at Swanwick station, which was presided over by Mr. Shepherd, stationmaster, Swanwick.

Mr. A. C. Holmes said that last season there were rather more than 450 vans for loose fruit provided, but this year it had not been possible to find more than 250 vans, and they had been obliged to make use of 18 passenger trains to make up the deficiency; this includes four first-class trains that were fitted up for the traffic, and these gave them a total number of 375 vehicles, but as the passenger trains were in blocks of 10, 9, 7, or 6 vehicles each, which could only be used for consignments going to one destination, they would see by this how heavily the staff were handicapped in dealing with the traffic. Last year the special trains sustained delay in starting to the extent of 2,162 minutes in the aggregate, whilst this season they had only occasioned a total delay of 1,482 minutes.

The season commenced last year a few days earlier than this year, and for the first 21 days the traffic was heavy, and on five occasions over 100,000 baskets per day were dealt with. On one day 126,000 were sent away. They had only sent away more than 100,000 baskets on two occasions this year, which they considered fortunate, as if they had been offered 100,000 on three consecutive days there would have been no vehicles available for the fourth day's traffic.

In the aggregate they were this year only just over 45,000 baskets behind the figures for the corresponding number of days last year. They had despatched nearly 1,500,000 baskets of fruit from Swanwick alone, and 2,490,000 from the whole district. The use of the passenger trains for the Manchester, Liverpool, London, and Kew Bridge specials had enabled them to unload the carts quicker, and had resulted in the last trains getting away to better time.

### Maintenance of Bridges over Railways.

ALTHOUGH legal cases in which railways are concerned do not receive extensive attention in these pages, that known as Pickfords *v.* Great Northern Railway is of such importance that reference is necessary. The point at issue was whether the obligation of a railway company to maintain highway bridges over its lines had to be interpreted in terms of the time of erection and a reasonable period beyond, or is applicable in view of new conditions arising many years later. That is, whether a railway company can be compelled to modernise its bridges to enable them to carry loads such as are now conveyed by motor traction, and much in excess of those contemplated when such bridges were put up.

In the first Court Mr. Justice Warrington held, amongst other points, that where a railway company was liable to maintain a bridge carrying a highway over the railway they were bound to maintain it in such a condition that it would be safe for the passage of traffic upon, and to be expected upon, the highway, and the measure of their obligation was not limited to the state of things which existed in reference to traffic at the time when the bridge was made. In June, 1915, the Court of Appeal reversed this judgment, holding that section 46 of the Act of 1845 did not impose any further obligation upon the defendants than to maintain "the bridge" and the approaches thereto which they had been bound to construct. There was no obligation upon the Company to improve or to strengthen the bridge, or in certain eventualities to rebuild it, in order to carry the increased traffic.

There was thus a divergence of opinion, though the decision of the Appeal Court is the more reasonable in that it recognised that any other interpretation would involve railways all over the country in the necessity for rebuilding hundreds of bridges to meet new conditions which were never contemplated, and because of changes in general transportation with which they, as railways, are not actually concerned. The case was, however, carried to the House of Lords, and there dismissed, the judgment of the Court of Appeal being affirmed, and Messrs. Pickford's having to bear the costs. Four of their Lordships were in favour of this course, and one against. Any other decision would have been manifestly unfair, for such interpretation would entail a continual responsibility, for once rebuilt it might equally arise that 20 or 30 years later another rebuild would be necessary, and so on.

### The Sir Edward Watkin Meritorious Fund.

PROBABLY no more effective means of perpetuating the memory of a name once famous throughout the railway world could possibly have been accomplished than by the operation of the Fund for rewarding meritorious conduct, established many years ago by the late Chairman of the Great Central Railway, Sir Edward Wm. Watkin, Bart., M.P. It was a generous impulse

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which prompted Sir Edward to give a sum of money sufficient to provide, for all time, out of the interest arising therefrom, a suitable reward for conspicuous acts of bravery and promptitude rendered by the staff in the discharge of their various daily duties. The money thus left by Sir Edward Watkin is invested in the names of the General Manager and Secretary of the Company for the time being, by whom the Fund is administered. The latest list of the Company's employees whose names have been inscribed on Sir Edward Watkin's Roll of Merit, and to whom awards have been made for the year 1915, includes from the Chief Mechanical Engineer's Department, 21 men; from the Engineer's Department, 10 men; from the Superintendent of the Line's Department, 46 men and one lady, Mrs. Farmery, of Habrough; from the Chief Goods Manager's Department, 2 men; from the Electrical Engineer's Department, 1 man; and from the Portmaster's Department, 3 men. Of those members of the staff who have thus been honoured, eight have gained the Certificate of Merit, signed by Sir Sam Fay and Mr. O. S. Holt, in addition to a grant of money from the Watkin Fund, namely: Fireman A. Palethorpe, Attercliffe; Mate A. Ball, Immingham; Gateman G. Hamilton, Immingham; Number-Taker W. F. Layton, Marylebone; Platelayer J. W. Palmer, Sheffield; Signalman G. E. Collins, Eckington; Extra Porter F. Barnes, Woodhead; Goods Guard W. Littledyke, Lincoln. In presenting the awards to those of the staff employed in the Manchester district, Mr. George J. Gibson, District Traffic Manager, said that this was one of the most pleasing duties he had to perform each year, and the recipients, while unable to go to the War, had this tangible evidence of their duty at home being well performed, upon which they were to be heartily complimented.

## Agricultural Development of East Anglia.

HOME production of foodstuffs is, at present, a matter of vital and national importance. The Great Eastern Railway has, for some time past, been instituting enquiries on the subject through the officials with the assistance of Mr. Edward Brown, F.L.S. (who has been temporarily retained by the Company for that purpose) and with the view to increase the production of such foodstuffs conferences have been held at which the following Boards, Societies and Associations have been represented:—

Board of Agriculture and Fisheries, Mr. P. G. Dallinger.

Eastern Counties Farmers' Co-operative Association, Miss L. Guymer, Mr. Clement Smith (Chairman), Mr. W. B. Colman.

East Suffolk County Education Committee, Mr. W. E. Watkins (Sec.), Canon Abbay.

East Suffolk Women's Agricultural Committee, Miss Connell.

Framlingham and District Agricultural Co-operative Society, Mr. W. Chambers, Mr. W. S. Pipe, Mr. E. G. Warren (Sec.).

Norfolk County War Agricultural Committee, Mr. Wm. Carr, The Hon. Florence Amherst, Mr. Verney Carter.

East Suffolk War Agricultural Committee, Mr. A. W. Oldershaw, B.Sc.

Co-operative Egg Society, Island of Lothingland, Mrs. Lynes.

The Agricultural Organisation Society, Mr. F. Graff, Mr. A. D. Allen.

Board of Trade, Ipswich, Miss d'E. Image.

It was felt at the outset that there were many branches of home food production which were capable of considerable further development, but that as a beginning that part relating to eggs and poultry should be the first to be dealt with, as already in some parts of the district considerable development has taken place—through the action of producers themselves. At the last conference held on August 2nd representatives of the three principal Societies interested in the production and sale of eggs, stated that:—

1. They were prepared to recommend their members to amalgamate in a new Egg Society composed, in the first instance, of members of the Stoke Ferry, the Eastern Counties and the Framlingham District Societies, and that this new Society should take steps immediately to cover with collecting depôts, the area of the Eastern Counties served by the Great Eastern Railway, and that they should be willing to take into membership other existing Egg Societies or Societies which may be formed for the same purpose.

2. That for the present the business of buying, collecting and selling eggs should be conducted by a Joint Committee formed by at least two members and the Acting Secretary or Manager for the egg business of each Society represented.

The Railway Company has undertaken: (1) To supply at a nominal rental sites for collecting depôts in their yards; (2) To consider the question of freight in relation to quantities of eggs sent by rail; and (3) To make experimental trials in certain districts, with a motor egg collecting van. They also propose, as soon as the necessary arrangements can be completed, to run a train through certain districts with an egg demonstration van equipped to give practical demonstration and lectures on the question of eggs and of poultry keeping, under the superintendence of Mr. Edward Brown, F.L.S., and qualified assistants. Also they hope to run a demonstration motor 'bus to villages from which it would be very difficult for those interested to get to the demonstration train. They will start a propaganda in the Eastern Counties under the superintendence of Mr. Edward Brown, on the completion of the harvest.

## The "Bencro" Patent Train Indicator.

IN our August article, "The Sunshine Line," when referring to the ingenious train indicators which are being installed at principal stations of the London, Brighton and South Coast Railway, we should have mentioned that these are



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the subject of a patent held by the inventor, Mr. J. Benn, managing director of Benn & Cronin, Ltd., 11, Borough High Street, who are the sole contractors for these indicators, and also for the advertisements exhibited inside carriages on the Brighton line. The indicators are a considerable saving in the time of the station staff, for they are an answer to many of the enquiries that are put by passengers. They are "fool-proof," for they can be placed in charge of an official who is solely responsible for making the necessary changes. They can be adapted to any class of service, and more than one can be installed at a central station for the purpose of localizing the information given. They can be adapted to all conditions, on a large or a small scale, and their wide utility is manifest, so that extensive use may be expected.

### Garden Inspection on the "UndergrounD."

THE annual inspection of the gardens on the UndergrounD system of railways was made by a Committee of Directors, assisted by officials, and in view of the excellence of many of the gardens the value of the awards was increased from £37 to £39 10s. In making the awards special attention was paid to the general condition of the garden, difficulties associated with the position, size of work undertaken, scheme and neatness of arrangement and choice of position as regards coming under the notice of passengers.

The awards are as follows:—

TWO FIRST PRIZES OF £5 EACH: *Northfields*, Inspector Fulwell; *Boston Manor*, Inspector Parker.

FOUR SECOND PRIZES OF £3 EACH: *Walham Green*, Foreman-Porter Macey; *Acton Town*, Inspector Mitchell; *Acton Town*, Platelayer Withall; *Acton Town*, Ganger Samphier.

ELEVEN THIRD PRIZES OF £1 EACH: *Whitechapel*, Fitter Gillman; *Walham Green*, Inspector Wild; *Lillie Bridge*, Gatekeeper Wood; *Earl's Court*, Travelling-Inspector Young; *Earl's Court*, Wireman Lyon; *South Kensington*, Platelayer Eccles; *West Kensington*, Inspector Goss; *Acton Town*, Mr. Oliver (Signal Dept.); *Acton Town*, Mr. Freeland (Signal Dept.); *Ealing Common*, Inspector Stinton; *South Harrow*, Signalman Jenner.

Thirteen fourth prizes of 10 shillings were also awarded.

### Palatial Rolling Stock for German Prisoners.

COMPLAINTS have been made that German prisoners have been conveyed in splendid main line corridor and saloon rolling stock, whereas British soldiers often have to put up with inferior stock. That this has occurred may be at once admitted, but as the *Railway News* points out, there are two sides to this question. When conveying troops it is often necessary to provide maximum accommodation per train, and vehicles are specially reserved for such traffic, the trains being kept ready for War Office use at suitable centres. Older vehicles without lavatories and corridors are most suitable, as the whole of the space is available for seating; while the trains are usually run on schedules which provide for the circumstances of each journey. Trains conveying prisoners often consist of vehicles in general traffic and not sets specially reserved therefor. It is imperative that lavatory accommodation shall be provided on the train, for it would not do to let prisoners run loose at stations, and so it follows that main line stock is used.

### North of Scotland as a Special Military Area.

NOTICE has been given that, in the exercise of the powers conferred on them by the Defence of the Realm (Consolidation) Regulations, 1914, the Army Council, with the concurrence of the Secretary for Scotland "on and after July 25th, 1916, a specified area, roughly north of the Caledonian Canal, will be a special military area. Something like a Continental frontier station is established at Inverness, where, unless the official permit is in order, anyone will be liable to be turned back. The area includes the burgh of Inverness and the whole of the mainland of Scotland which is situate to the north and west of the River Ness, Loch Ness, the road leading from Invermoriston Pier by Glenmoriston to Strathclunie and the River Shiel to Shielbridge. Loch Duich, Loch Alsh, and the Kyle of Loch Alsh."

"Except as otherwise provided by the regulation, no person shall on or after that date be allowed to enter the area without permission from the Commandant at Inverness. Permit books containing forms of applications and instructions as to how applications should be made are obtainable from any police station. Persons exempted from the provisions of the regulations include members of His Majesty's Forces, officials of the Crown, any person under sixteen years of age, all dockyard men employed in the area, and all persons who are or have been since August 4th, 1914, resident within the area or in any part of the counties of Inverness, Ross, Elgin, or Nairn." Railway tickets are not, therefore, issued to the restricted area except to persons in possession of permits, which permits require to include a photograph of the holder. Adequacy of purpose also has to be proved before such a permit is issued.

### Half-yearly Dividend Declarations.

NEARLY every railway has declared interim dividends for the first half of the present year at the same rates as twelve months ago. This is, in some respects, a good sign, and not much variation could be expected seeing that the Government guarantee still applies. That all lines are carrying traffic on a scale not before contemplated is now generally realised, but little present benefit can be obtained therefrom, those systems which are to-day carrying a large volume of passenger traffic having to compensate

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for those whose activities are primarily occupied in meeting national requirements. As showing the uncertainty of the position in view of the peculiar demands and the special conditions, an announcement by the North British Railway raises a question which affects many of the railways of the country, and apparently calls for some revision of the Government terms for the user of the lines. The railway in question has decided to pay no interim dividend on the ordinary stock owing to a dispute with the Government with regard to an alleged increase of £100,000 in the expenditure under the head of wagon repairs.

### The Railway Club.

NOTWITHSTANDING the considerable number of members now serving with His Majesty's Forces, the Railway Club is still enabled to continue its activities, and a notable programme of papers has been arranged for the 1916–7 session. General meetings will recommence on Tuesday, September 12th, when Mr. J. F. Gairns, Editor of the RAILWAY MAGAZINE, will read a paper on "The Electric Locomotive." For the present meetings will commence at 7 p.m. On October 10th Mr. A. W. Bartlett will deal with the "North London Railway," and on November 14th Mr. G. W. J. Potter will take as his subject "Railway Timetable Maps—Summer, 1916." We may remind readers that the Club premises at 92, Victoria Street, Westminster, are available for the use of members at any time, while the library constitutes one of the most comprehensive collections of railway literature of all kinds available anywhere. Readers who may wish to attend any of the meetings above mentioned should apply for visitors' tickets to the Hon. Sec., Mr. E. J. Miller, at the address noted.

### The Central Goods Clearing House Scheme.

FOR some time past articles, paragraphs and letters have appeared in various publications discussing the proposed Central Goods Clearing House Scheme promoted by Mr. A. W. Gattie and the New Transport Co., Ltd. Incidentally this has produced one of Mr. E. A. Pratt's useful booklets, referred to under "Railway Literature" on another page. On the whole it cannot be considered that the case for the scheme has been well presented, and Mr. Gattie would be well-advised to adopt a somewhat different tone in his letters and articles, if he wishes to see his really clever appliances taken up by railway companies. We have been privileged to inspect his appliances, and readily give the inventor all the credit that he deserves. Incidentally we see no reason why some of them should not find favour in actual use, though possibly not on the ambitious scale contemplated by Mr. Gattie. On the other hand, the charges that railways are badly managed, that they are wasteful, that improvements are deliberately avoided and responsible officers incompetent, and that railway wagons spend most of their time out of use or warehousing goods, can only be described as absurd. These and other statements simply show that those who make them really know little about railway goods traffic, and after giving most careful consideration to Mr. Gattie's scheme, reading his pamphlets, attending meetings where the subject has been discussed, and inspecting the appliances, it must be candidly admitted that there appears very little in the proposal, beyond the possible usefulness of some of the appliances.

### Are there too many Goods Stations?

THERE may be a few places where two or more goods stations in the same district, established in the old competitive days by rival railways, could be replaced by one. But as a general statement there are no superfluous goods stations. Even if one would replace two or three it would have to be of the combined capacity, and would require the railway connections of all of them, and these must be distributed, to suit the conditions of the various districts, and to avoid the congestion which is the inevitable corollary to extreme centralisation. A central clearing house is the remedy proposed; but does Mr. Gattie really appreciate what the centralisation in one depôt in London would really mean? It is true that he uses big figures, and admits enormous expense; but that is not the same thing as realising the volume and complexity of traffic represented. Think of all the traffic represented by the goods sorting yards and sidings concentrated in one area, even with a multiplicity of appliances in a many-storied building, with the equivalent to perhaps 100,000 wagon loads dealt with daily.

To a point it is correct that economy consists in large scale organisation; but when a certain degree is reached, complexity becomes so great that the only remedy is to sectionalise the work again. This is, where, in our opinion the big scheme is doomed to failure. Further, it does not take into account the thousands of wagons which, because of the nature of the loads, must be loaded in bulk at the nearest convenient centre, and for which the numerous goods stations are primarily intended.

### Clearing House System already in use.

To a certain extent the Clearing House system is already in use. Long distance goods trains usually run only between sorting yards and exchange sidings; and they are fed by comprehensive systems of local goods trains running between the sorting sidings and the various goods depôts, docks or yards. It is only where complete or nearly complete train loads are concerned that the trains run through intact from destination to destination. Moreover, it is not usual to work goods trains with partial loads if that can be avoided, except perhaps on pick-up duties or for local distribution or branch lines, so that whatever the system adopted there would still be substantially the same number of

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trains running. Moreover, there are numerous tranship sheds about the country, where the clearing system is adopted for less than wagon loads, and many of these are located at centres where the establishment of Gattie premises is improbable, though for traffic reasons they are far more important than the great towns.

### If Things had always been so.

BUT the great stumbling block Mr. Gattie is up against is that while his scheme might have been eminently satisfactory had it been adopted in early days, it is impossible without a "clean sweep" of nearly all the present arrangements. It is all very well to suggest that one of these clearing houses should be brought into use; but until others are available half the benefit is lost, and what about the hundreds of towns of intermediate size which account for many goods train loads daily, though they hardly suggest themselves as probable locations for these special premises. Incidentally it may be that large firms would be prepared to adopt the system of containers and the like necessary to the Gattie scheme, but how about the thousands of smaller firms who in the aggregate provide a considerable proportion of the traffic of our railways, and whose requirements are often much more varied in quantity and character of goods, and in destinations.

Individual ownership of wagons has probably caused a degree of complexity of working and a slight superfluity of wagon user, but it has not needed this war to introduce methods of inter-working and of corollating services and facilities. Many of these have been adopted more or less for years past, and the policy would have been extended quite independently of the need for meeting the peculiar difficulties associated with this period of stress.

The fact is that railway traffic is of so varied a character that no scheme of this character can do more than to ameliorate conditions, and even that is very questionable, and it is well that this fact should be recognised at once, especially when the remedy proposed would itself involve enormous expense and could only be realised by means which are inconceivable at this stage. And the methods which have been followed of late in promoting this scheme are certainly not calculated to favour its realisation. Irresponsible statements can rarely be substantiated; and it is as true as ever that figures can be made to prove almost anything if carefully selected to suit one's requirements.

One newspaper extract brought to our notice included the following gem: "Whilst thousands of tons of goods are being carried up and down our railways from Cornwall to Caithness, from Anglesey to Norfolk, because there is no space left in docks, yards or sidings for its accommodation." What mare's nest the writer of this—not Mr. Gattie—has got hold of is difficult to understand; it is certainly a new view of railway methods!!

### Long Service Men at Crewe Works.

MR. W. RILEY, a turner, employed in Crewe Works, London and North Western Railway, commenced work June, 1856, in the boiler shop as a rivet boy, under the late Mr. Harry Cooper. Later he was transferred to the Forge, thence to No.2 Pattern Shop, and finally to the Old Works Fitting Shop, where he has worked for the past 55 years. He has only lost ½ hour during the last 15 years, which was due to sickness. Mr. G. Kendal, a smith, also employed in Crewe Works, commenced work at Longsight in the Boiler Department as rivet boy April, 1856, under Mr. J. Ramsbottom, Superintendent, and was transferred to Crewe Works, November, 1900. During the whole of this time he has only been away from duty for a period of 16 weeks through sickness and accident.

### Penistone Viaduct Re-opened for Traffic.

REBUILDING of the arches of Penistone Viaduct which failed last February having been completed, traffic was resumed between Penistone and Denby Dale on Monday, August 14th, local trains again working from Penistone to Huddersfield and the Lancashire and Yorkshire Railway system. On the same date the 10 a.m. and 6.20 p.m. down and 10 a.m. and 5.0 p.m. up restaurant car expresses between London (Marylebone) and Bradford (Exchange) were reinstated by the Great Central and Lancashire and Yorkshire Companies, through carriages to and from Bradford being also run on the 12.15 p.m. on weekdays and 5.30 p.m. on Sundays from Marylebone, and the 1.35 p.m. on weekdays and 4.0 p.m. on Sundays from Bradford. Through bookings between the two railways concerned *viâ* this route are also again in force.

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THE general report on accidents on railways of the United Kingdom during 1915 shows an increase of 249 in the number of persons killed and of 1,418 in the total injured as compared with the previous year. 269 passengers were killed and 1,432 injured from accidents to trains. These include 224 who lost their lives, whilst 242 others were injured, in the double collision at Quintinshill, between a troop train from the North, a local passenger train from Carlisle, and an express travelling North. This is stated in the report to have caused the greatest loss of life that has ever occurred in an accident on the railways of the United Kingdom. It was due to the mistake of a signalman. Altogether the number of lives lost in 1915 was 1,364, as compared with 1,115 in 1914, while the injured last year totalled 9,268, as compared with 7,850 in the previous year. As a contemporary advisedly points out, during 1915 there were killed 3,014 persons and 60,189 injured by vehicles on public highways in the United Kingdom.

* * *

FOR 1916 the annual meeting of the Furness and Barrow Branch of the Royal Society for the Prevention of Cruelty to Animals was held in the Town Hall, Barrow. The chair was occupied by the Mayor (Alderman A. Barrow), and he was supported by Mr. Alfred Aslett, J.P., the well-known Secretary and General Manager of the Furness Railway and the Chairman of the Furness and Barrow Branch, and Mr. T. Jackson, the hon. secretary. Mr. Alfred Aslett, in moving the adoption of the report, said: Col. Lord Richard Cavendish, the President of the Furness and Barrow branch, has, much to our regret, been prevented from being present at our fifth annual meeting. Lord Richard Cavendish had quite intended coming to Barrow, but has just been appointed to serve on an important sub-Committee of the Re-construction Committee, the first meeting of which was being held that day, and could not, therefore, leave town. Mr. R. Brockbank, J.P., seconded the adoption of the report, and spoke of the very great work done for the Society by Mr. Aslett, who was a strenuous business man, and yet found time to further the interests of the Society.

* * *

IN consequence of petrol restrictions the London General Omnibus Co., Ltd., have withdrawn a few services, curtailed some and extended others in partial compensation, and otherwise done what is possible to mitigate any inconvenience to the public. To meet the needs of munition workers certain services have been amplified and new ones added, this being a matter of necessity even if other facilities have to be reduced in consequence.

* * *

IN order to afford ambulance workers at Paddington practice in loading injured persons into and out of railway carriages, some empty coaches were placed at disposal at the end of Platform No. 1A, on a recent Sunday morning. Upwards of sixty ambulance men, representing all grades of the staff in the London (A) Division, participated in the practice. The conditions which might be expected to attend a railway accident were, as nearly as practicable, maintained, in that the "patients" were scattered in various positions, *e.g.*, in or under the carriages or on rough ground in the immediate vicinity, and ambulance men were called upon to render treatment in respect of supposed injuries, the natures of which were indicated by labels attached to the clothing of the "patients." The patients were afterwards carried by various methods and placed into a train, where Dr. J. M. Carvell inspected them and gave advice concerning the treatment adopted. In some instances regulation appliances were available, whilst in others all material had to be improvised. "Cases" calling for hospital attention were conveyed on stretchers and loaded into a motor van standing alongside.

* * *

GENERAL satisfaction is expressed by the multitude of friends and admirers of Mr. H. W. Thornton, General Manager of the Great Eastern Railway, on the official announcement of his appointment as Honorary Lieutenant-Colonel of the Engineer and Railway Staff Corps (Territorials). Great Eastern Railway officials and the staff generally are particularly gratified.

* * *

MR. CHARLES LE MAISTRE, A.M.Inst.C.E., M.Inst.E.E., who has been in charge of the work of the electrical section of the Engineering Standards Committee since 1903, has been appointed Secretary in succession to the late Mr. Leslie S. Robertson, M.Inst.C.E., who was lost with Lord Kitchener in the disaster to H.M.S. *Hampshire*. Mr. Leslie Robertson was well known as the Chairman of the Schmidt Superheating Co., Ltd., and was largely concerned with the development of superheating apparatus for locomotives in the United Kingdom.



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A NEW 60 in. by 40 in. "Harvest" poster—the work of Mr. J. Walter West—now showing at "UndergrounD" stations, is topical in view of its bearing upon the food supply of the nation. Although the exhibition of new pictorial advertising has ceased for the time being on the "UndergrounD," the "Harvest" poster has been issued as arrangements had been made for its production, and it is felt that its publication would be a reminder to the public to see for themselves the growing fields of ripening corn which exist but a few miles from the Metropolis. It also illustrates another modern movement, the employment of women on the land. It marks a new era and the revival in agricultural life.

* * *

THE annual prize meeting in connection with the Midland Railway Rifle Club took place at Derby on July 22nd. The club was inaugurated in 1904, mainly on the initiative of Major D. Bain, Carriage and Wagon Superintendent, Midland Railway, who remains the captain of the club. The principal contest was for the challenge cup given by Sir Ernest Paget, Bart., late Chairman of the Midland Company.

* * *

OUR congratulations to Mr. Frank Wildman, Head Waiter of the London and North Western Royal Train, and Chef C. T. Tobin of the Euston Hotel, who, on a recent royal journey from the North, were the recipients of a beautiful pin set in blue enamel and a handsome set of gold sleeve links, respectively, gifts from His Majesty King George.

* * *

THE Great Northern Railway express which hitherto has left Ripon at 9.15 a.m., and Harrogate at 9.45 a.m. for London, now starts 25 minutes later, and is due at King's Cross at 2.20 p.m. This alteration partially compensates for the deceleration of this service occasioned by the combination of trains which took effect following the withdrawal of restaurant cars.

* * *

WE regret to record the death in action of Lieutenant G. S. Kaye Butterworth, Durham Light Infantry, only son of Sir Alexander Kaye Butterworth, General Manager, North Eastern Railway. Mr. Butterworth had adopted a musical career and was coming to the fore as a composer, several of his works having been performed.

* * *

ON the Great Eastern Railway posters have lately appeared offering facilities for the establishment of milk, egg, and poultry farms, coupled with advantageous rates for transport. The limit of low carriage rates for cheap farm produce has also been extended to 80 lb.

* * *

LANCASHIRE and Yorkshire Railway electric trains running between Manchester and Bury on Sundays are now made up of third-class cars only, and first-class tickets are not issued for these trains.

A READER points out that No. 153 South Eastern and Chatham Railway is a 0-6-0 shunting tank engine employed at Bricklayer's Arms Depôt, and not a Stirling 7 ft. 4-4-0 engine as stated recently.

* * *

LORD GEORGE HAMILTON, who has been appointed Chairman of the Mesopotamia Commission, is Chairman of the Metropolitan District Railway.

* * *

IN June, 1916, RAILWAY MAGAZINE, reference was made to the old Great Western 4-4-0 7 ft. coupled engine No. 7 *Armstrong*. A Swindon reader mentions she has come in for general repair, with driving axle broken in half at crank web, also both wheel rims cracked in several places. She now carries a "taper boiler." He also notes remarks *re* No. 3545 on the Southampton-Portsmouth route. This engine has just been in for repairs, and has been fitted with Belpaire firebox and straight boiler, instead of domed firebox as hitherto. She is painted the new "Khaki and black" colours.

* * *

MR. W. LAW, J.P., General Manager, Swansea Harbour Trust, who has been in the service of the Commissioners for twenty-four years, has retired. Formerly Mr. Law was connected with the North Eastern Railway at Tyne Dock, and afterwards was the dock superintendent of the Hull and Barnsley Railway.

* * *

MR. R. H. CARR, Midland Railway, is Chairman of the Joint Claims Committee (English and Welsh Companies), held monthly at the Railway Clearing House, for the six months ending December, 1916.

* * *

IT has been decided by the various railways that the war bonus of 5s. per week now paid to certain classes of employés shall be extended to male members of the salaried staff whose salaries do not exceed £200 per annum. Male employés receiving over £200 and less than £213 per annum will be paid such an amount of war bonus as will make up their regular rate of pay to £213 per annum.

* * *

TRAINS leaving London during what would have been the Bank Holiday period were crowded, and reports from holiday places pointed to a great influx of visitors. But the character of the holiday exodus had entirely changed. Except for soldiers or sailors, few of the railway passengers were men of military age or fitness, and many of those who did travel were evidently stealing a few days' respite, or arranging a short vacation so that journeys to business would be convenient twice or several times during their stay away from town. It was chiefly a women's and children's holiday this season.

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MR. G. H. CANNON writes: "With regard to the paragraph on page 139 of the August RAILWAY MAGAZINE, entitled 'Travel by Ambulance Train,' I think I can add a few details: London and South Western Railway 4–4–0 No. 710 was piloted by Midland and South Western Junction Railway 0–6–0 No. 20, and the Midland locomotive that took the train on was No. 466 (4–4–0)." He also mentions that on July 23rd he saw a Lancashire and Yorkshire Red Cross train, with two London and North Western bogie vans, hauled by London and South Western 4–4–0 engine No. 707, assisted by Midland and South Western Junction Railway 2–4–0 engine No. 12.

* * *

THE staff of the London and South Western Railway having been invited by the Master Cutler of Sheffield to contribute spare razors for the use of the troops at the front, we learn that no fewer than 2,676 razors have been received and forwarded to the Master Cutler in answer to this appeal.

* * *

FROM Crewe, Mr. C. Williams writes:—"In his reply to H. G. C., on page 67 of the July RAILWAY MAGAZINE, concerning Sharp's singles converted to tank engines on the London and North Western Railway, E. C. C. says: 'One, No. 446, had been No. 146 on the Southern Division list, and was built in 1847.' As a matter of fact, No. 446 never ran on the Southern Division at all. It was built in 1846 for the Manchester and Huddersfield line, and when transferred to the London and North Western Railway in 1847 it became No. 46 on the North Eastern Division list. Originally it is said to have borne the name *Brooke*. In the combined list the engines of the North Eastern Division had 400 and those of the Southern Division had 600 added to their original numbers, to fit in with those of the Northern Division. Thus S.D. engine No. 146, above referred to, became No. 746. This also, it may be added, was a Sharp's 5 ft. single, but unlike No. 446, appears to have ended its career as a tender engine."

* * *

THE new series of London and North Western four-cylinder passenger engines ("Claughton" class), referred to in a recent issue of the RAILWAY MAGAZINE, is now in hand at Crewe. The first three are Nos. 511 *George Macpherson*, 695 *Sir Arthur Lawley*, and 968 *Lord Kenyon*. No. 127 *Snake* ("Precursor" class) has recently been re-fitted with the Weir pump and water heater, which some time ago was removed for repairs.

* * *

AT the concluding meeting of the series of Operating Efficiency Meetings, arranged by the London UndergrounD Railways and L.G.O.C. Group, for the season 1915–1916, a paper on "Tickets—Their Origin, Use and Development," was read by Mr. F. C. Bingham, of the passenger agent's department, Mr. H. E. Blain, Operating Manager, presided over a good attendance.

WE regret to record the death of Mr. C. W. Bayley, who retired from the post of Chief Traffic Manager, Lancashire and Yorkshire Railway, in 1910. He entered the service of the Company in 1857 in the audit department.

* * *

A READER remarks that the illustration of the Great Western locomotive No. 3558 (4–4–0 type), on page 84 of the RAILWAY MAGAZINE for August, is probably dated about 1902 or 1903. In the latter year the coned boiler first made its appearance on the Great Western Railway, with the advent of the ten locomotives of the "City" class. All the engines on the Great Western Railway (with the exception of one or two 2–4–0 locomotives of the 3206 to 3225 class, see illustration on page 421 of the last volume), which were built or re-built with the type of boiler shown in the August illustration, have since been successively fitted with copper-capped chimney (which became once more this Company's standard pattern), coned boiler, and last of all, the top feed. Further, No. 3558 does not belong to the "Stella" class. The latter engines are of the 2–4–0 type, converted from side tank engines with the same wheel arrangement. The 3558 class are converted from engines of the 0–4–4T type. References to these engines and their work occur in the Pertinent Paragraphs section of Vol. XXXVIII. of the RAILWAY MAGAZINE.

* * *

MR. W. H. WHITWORTH writes that the 1910 series of superheater 2–4–2 tank engines on the Lancashire and Yorkshire Railway covers Nos. 1526–1545 inclusive. Others of the 2–4–2 class rebuilt with superheaters are Nos. 58, 627, 1529 and 1539. Our correspondent mentions further that he has on several occasions lately seen Red Cross trains coming into Mayfield station, Manchester, frequently with London and North Western engine No. 132 *S. R. Graves* ("George V." class.) He continues: "On Saturday afternoons a Cambrian 0–6–0 goods engine often works a troop train to Crewe. The engine is usually No. 93 and is exchanged for a London and North Western locomotive at Crewe. No. 126 *Anzac* and 877 *Raymond Poincare* have gone to Shed 27 (Preston) and 233 *Suvla Bay*, all 'Prince of Wales' class, to Shed 17 (Leeds). No. 2040 *Oliver Goldsmith*, of the same type, which has been at Preston since she first came out, has now gone to Shed 29 (Carlisle)."

* * *

A FRESH venture at Fairbourne, a small seaside village near Barmouth in Wales, has been entered upon by the London Company owning the model railways at Blackpool and other holiday resorts in Great Britain. Originally a horse tramway, 2 ft. gauge, ran from the Cambrian Railway station at Fairholme to the ferry, a distance of 1½ miles, and this old line has been acquired, and the gauge reduced to 16½ in. Messrs. Bassett, Lowke & Co., have supplied a locomotive and three diminutive open coaches, the latter being 3 ft. 6 in. wide, a few inches wider than the older models. The engine is one of the builders' "Giant" class.

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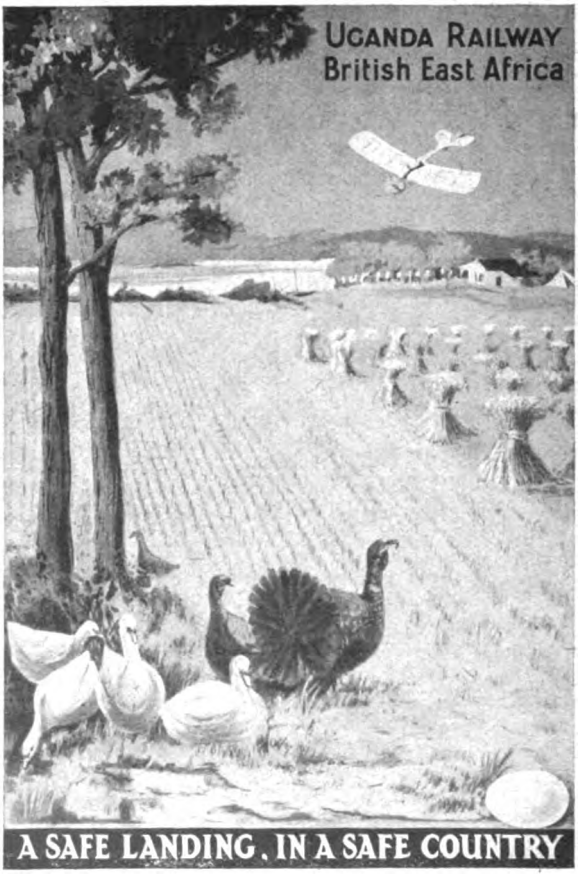
IT is reported by the United States Commercial Attaché at Petrograd that the railway extension from Julfa, on the River Araxes, to Tabreez, has been completed. The gauge is the same as that of the Russian railway system. The line is under Russian control and management, and is not at present intended for passengers. The track follows between Julfa and Tabreez the line of the Indo-European telegraph system of India. From the town of Sophian, about 25 miles from Tabreez, a branch of the railway has been completed to Lake Urumiah, around which is one of the richest districts of Persia. This railway, with its branch line, will doubtless cause an enormous development through all this part of Persia. Possibly the railway may be extended to Teheran and thence south-east to Ispahan, and into Baluchistan, whence it could connect up at Nushki with the railway system of British India.

* *

ON this page appears a half-tone reproduction of a striking Uganda Railway double-royal poster. The original is printed in eight colours. RAILWAY MAGAZINE readers engaged in manufacturing trades are advised to get into close touch with the commercial prospects of British East Africa and Uganda. Having in view the position of military affairs in East Africa and the succession of British triumphs over the German forces there is little doubt that the eyes of the rest of the world will soon be focussed on this portion of it as a centre for trade and commerce, and every indication points to a tremendous boom on our return to peaceful times and normal conditions. We have to congratulate the Honourable B. Eastwood, General Manager, Uganda Railway, on being advanced to the rank of colonel and on the honour of being mentioned in General Smut's report. Readers who desire full particulars of the district served by the Uganda Railway for the purposes of trade, sport, or prospective settlement, should apply to the European representative, Mr. D. G. Longworth, Dewar House, Haymarket, London, S.W., who is always ready to give information concerning "the line that rocks the cradle of the Nile."




UGANDA RAILWAY PUBLICITY UP-TO-DATE.

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ONE of the most successful of its kind was the Train Despatchers' Association of America's annual convention, held this year in Toronto. The Mayor of Toronto welcomed the delegates and important addresses were made by U. E. Gillen, General Superintendent, Grand Trunk Railway, Chicago; A. J. Hills, General Superintendent, Canadian Northern Railway, Toronto; Geo. Spencer, Chief Operating Officer, Board of Railway Commissioners of Canada; T. Collins, Superintendent, Canadian Pacific Railway, London; H. T. Malcomson, Superintendent, Toronto, Hamilton and Buffalo Railway, Hamilton. The delegates travelled in a special train over the Grand Trunk lines from Toronto to Niagara Falls, giving the railwaymen an opportunity of inspecting the Garden Land of Ontario, with its hundreds of square miles of orchards.

* * *

OPEN-TOP observation cars are now being operated through the Royal Gorge and the Black Canon of the Gunnison in Colorado by the Denver and Rio Grande Railroad on all daylight trains passing through these remarkable gorges. These cars are unique, in that they have no tops and permit of an unobstructed view of the passing rugged grandeur of the Rockies.

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MR. WM. PHILLIPS, European Manager, Canadian Northern Railway, sailed from Liverpool on August 12th, by the Cunard Liner *Saxonia* on his return to Canada, where he will take up a new and responsible position at the Company's head offices in Toronto. During his residence in England he has made many friends both in business and social circles, who will greatly regret his departure. Canadian born, Mr. Phillips has throughout his career been closely associated with railway and shipping affairs. In 1885 he was connected with the Grand Trunk Railway at Toronto, ten years later being appointed North-West Agent at Winnipeg to the North-West Transportation Company (now the Canada Steamship Lines, Ltd.). Subsequently he joined the staff of the Canadian Northern Railway as their General Eastern Agent, and on the opening of the Company's lines in Eastern Canada he became their General Freight and Passenger Agent, representing both the railway and the Atlantic steamship service, which was inaugurated in 1910. From Canada Mr. Phillips came to London in 1912 as European Traffic Manager, and two years afterwards was appointed European Railway and Steamship Manager. Shortly after the outbreak of war the Company's steamers were taken over by the Government, which involved important Admiralty work, and Mr. Phillips also took a prominent part in connection with the working agreement made between the Canadian Northern and the Cunard Line, to which Company the Canadian Northern steamers were transferred. Prior to his departure, Mr. Phillips received from the Lord Mayor of Bristol a letter conveying the best wishes of the business community, and another from Alderman H. W. Twiggs, on behalf of the Bristol Docks Committee. He was also made the recipient of a number of presentations from his staff in England.

* * *

THE official report concerning the Indian troop train disaster in regard to the 136 cases of heat stroke, of which nineteen ended fatally, amongst the British soldiers sent from Karachi to the Punjab in June without proper precautions, states that there can be no doubt that the train left Karachi insufficiently equipped, overcrowded, and without experienced officers, either medical or combatant. The responsibility is therefore placed upon Brigadier-General Roe, on the General Officer Commanding, and on the Senior Medical Officer at Karachi. These three officers have therefore been removed. It is satisfactory to note that no blame appears to attach to any of the railway officials concerned, and that all that was possible seems to have been done by the local authorities throughout the journey.

* * *

AN order has been placed by the Buenos Ayres Western Railway with the Leeds Forge Company for underframes and bogies for motor coaches, and bogies for trailer coaches. These materials are for rolling stock now being built in England in view of the electrification of a portion of the Western Railway's system.

A CONSTRUCTION Battalion is being raised by Lieut.-Col. Blair Ripley, M.Can.Soc.C.E., heretofore Engineer of Grade Separation, Canadian Pacific Railway, Toronto. In connection with this effort, an electric car was used for recruiting purposes. The car was lent by the Toronto Street Railway, and was decorated by men of the battalion, Lieut. G. Fleming, son of Mr. R. J. Fleming, General Manager, Toronto Railway, being in charge of recruiting for the battalion.

* * *

PRACTICAL use of the Canadian railways is made by the Dairy Branch of the Department of Agriculture, Saskatchewan, which, in conjunction with the College of Agriculture, Saskatoon, has recently completed a series of meetings in the interests of dairying through the medium of a special dairy car. An ordinary passenger coach provides a comfortable place for an audience to assemble and is fitted with a modern lantern and canvas for illustrated pictures. The lecturers carried more than one hundred slides showing photographs of some of the world's best dairy animals, sanitary stables, dairy utensils and other information of interest. Altogether ninety-one meetings were held, the total attendance being 3,536. This shows an average attendance of 38·8.

* * *

A CANADIAN correspondent states that the Canadian Pacific Railway has ordered the following new rolling stock from the Angus shops :—*Passenger.*—12 steel mail cars ; 1 steel mail and express car ; 4 steel baggage cars ; 1 steel diner. *Freight.*—102 freight refrigerator cars ; 50 press refrigerator cars ; 3 stock cars ; 81 automobile cars ; 474 box cars.

* * *

A RAILWAY MAGAZINE reader in Southern Nigeria reports that the first train of coal from the Udi coalfields recently reached Port Harcourt, the sea terminus of the railway, and 150 miles by rail from the fields. The Udi coalfields are of great extent, and the quality of the coal promises to be better than was at first anticipated.

* * *

RECENTLY the South Indian Railway received a number of 4-6-0 engines constructed by the Baldwin Locomotive Works. These engines are intended for goods service on the metre gauge section of the South Indian—a service that is worked almost exclusively by the "B" class, 4-6-0 Indian standards type.

* * *

DURING his visit to Western Canada the Duke of Connaught named the new Canadian Pacific Railway tunnel under the Selkirk mountains "The Selkirk." His Royal Highness, in a brief speech, highly complimented the Canadian Pacific Railway on the successful completion of their great enterprise, making personal reference to Mr. Grant Hall, Mr. John Sullivan and Mr. Dennis. The Duke's remarks were responded to on behalf of the Canadian Pacific Railway by Mr. Grant Hall, General Manager, Western Lines.



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# Railway Literature.

RECORDS OF RAILWAY INTERESTS IN THE WAR [PART III.]. [*The Railway News*. Price 1s. net. Post free 1s. 4d.] Parts I. and II. covered the period from the Declaration of War in August, 1914, to the end of April, 1915, and the volume now published deals with subsequent developments until July, 1916. Our contemporary is to be congratulated upon producing these volumes, seeing that they bring together so much material which is liable to be lost sight of in the pages of a weekly journal, and thus preserve for future reference information and data which will be invaluable in the years to come. Incidentally, it is only when material is thus brought together that one can realise how great are the services which our railways are rendering during this period of stress and difficulty, nor how widely the war has affected railway material, men (and women), methods and machinery. Within the limits of 118 full-sized pages are included particulars of virtually all the ambulance trains equipped here for use at home or abroad since the publication of the second part of this "Record," with complete illustrations and diagrams; information concerning the sinking of the *Sussex*, the capture of the *Brussels*, the loss of the *Tara* and the reception of the survivors by the London and North Western Railway directors and officers; soldiers' and sailors' travelling arrangements; "rest rooms" and buffets for members of His Majesty's Forces provided at railway stations; the work of the Voluntary Aid Detachment and the Y.M.C.A. at stations. In addition reference is made to the arrangements between railway companies and the State, Post Office work, enlistment of railwaymen, the coming of the "conductorette," the invasion of female labour on railways in various aspects, railway companies' Rolls of Honour, railway directors, officials and employés and war work, honours for railway officials, etc., while the financial position of railways under war conditions is adequately reviewed. Last, but not least, references at the last annual meeting by railway chairmen to the war, to railway staffs, and to the new conditions created, are collected together for permanent reference. This is a most valuable compendium which every one interested in railways should possess; and it would be cheap at double or treble the price.

A LONDON TRANSPORT TRUST. By Edwin A. Pratt. [P. S. King & Son, Ltd. Price 1s. net.] This booklet, described as a "criticism of an impracticable scheme," is a discussion of the scheme for a Central Goods Clearing House, associated with the name of Mr. A. W. Gattie, and the New Transport Company, Limited. The subject is referred to in "Pertinent Paragraphs" in this issue of the RAILWAY MAGAZINE, by reason of the correspondence and discussion which has been caused in certain railway journals, and which has extended to the columns of general newspapers. Mr. Pratt is entirely adverse to the scheme, and his reasons therefor are well set forth in this booklet, from the financial and economic aspects, as well as from the practical point of view. A copy should certainly be obtained by all to whom the subject appeals; and Mr. Pratt's criticism may be compared with our own remarks, which were written quite independently, and before the booklet under notice had been perused. Copies can be obtained by post from the RAILWAY MAGAZINE Office, 1s. 2d. each.

PUBLISHED as the organ of the recreative and educational associations of the London and North Western Railway staff, the *London and North Western Railway Gazette* is conducted in such a capable manner that it most efficiently fulfils its mission and provides a monthly budget of news and illustrations of no small interest to the employés on the "premier" line. Owing to the enormous increase in the cost of paper by reason of the war, our much appreciated contemporary has raised its price, beginning August, from one penny to twopence. Such is its hold on its many readers, there is little doubt that the extra penny will be cheerfully forthcoming. The August issue, among much other bright and attractive railway reading and illustrations, contains reproductions of two striking railway photographs by F. E. Mackay.

MESSRS. R. MARTENS & CO., LTD., of 149, Leadenhall Street, London, E.C., send a copy of an Economic Map of Russia designed to be of use in connection with the new trade conditions which are expected to arise after the war. Information of a useful character is appended.



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*Photo]* *[E. A. Gurney-Smith.*

**LONDON AND SOUTH WESTERN RAILWAY.**

**West of England train passing Crewkerne.**
**4-4-0 locomotive No. 750.**

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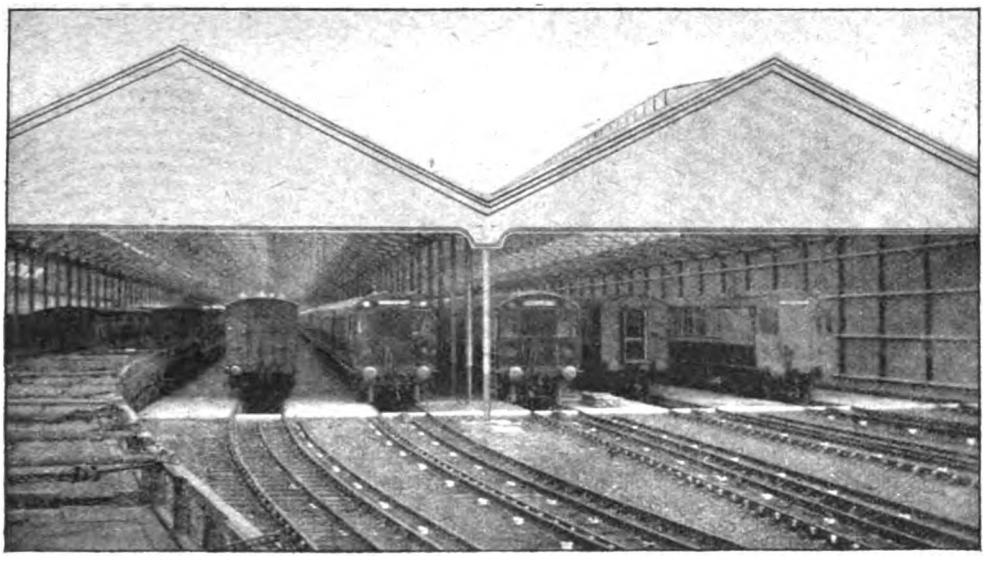

WATFORD RUNNING SHED FOR ELECTRICAL STOCK.

# Electric Traction on the London and North Western and North London Railways.

## THE FIRST STAGE OF ANOTHER GREAT ELECTRIFICATION UNDERTAKING.

IN recent issues we have dealt with the important electrification works undertaken by the London and South Western Railway; but while that has progressed rather more rapidly than the equally notable and comprehensive scheme promoted by the London and North Western and North London Railways, the latter calls for special consideration seeing that besides equipment for traction by electricity it also involves heavy engineering works of a difficult character. Indeed, the addition of a third tunnel of about a mile in length, or rather two such tunnels seeing that they are being constructed each for a single line on "tube" principles, and the heavy alterations in progress at Chalk Farm to provide for the comprehensive and elaborate system of burrowing and inter-connecting junctions already described in these pages, differentiate the scheme promoted from Euston entirely from otherwise corresponding undertakings.

Consequently, while we have to chronicle the virtual completion of the first stage of the scheme outlined in the RAILWAY MAGAZINE for December, 1911, there still remains a great deal to be done before the full extent and possibilities of this undertaking as a whole are revealed. Moreover, although electrification is now becoming an important factor in North Western progress, the time is not yet ripe for developing facilities to the degree contemplated, and therefore, at present, it is only the Broad Street–Richmond and Kew Bridge route which is to be added to the electrically operated routes of the Metropolis. No great changes in train services will, for the present, be made, though, commencing October 1st, when public electric working is announced, the running time between Broad Street and Richmond will be reduced by about 10 min.

But although the main scheme has still to be realised, and it will be some time before electric trains can be worked through from Euston and Broad Street to Watford, owing to the fact that the Chalk Farm alterations and the additional tunnels under Primrose Hill, though in progress, cannot yet be made available, the step forward now made is an important one. Pending a full description of the completed undertaking, the



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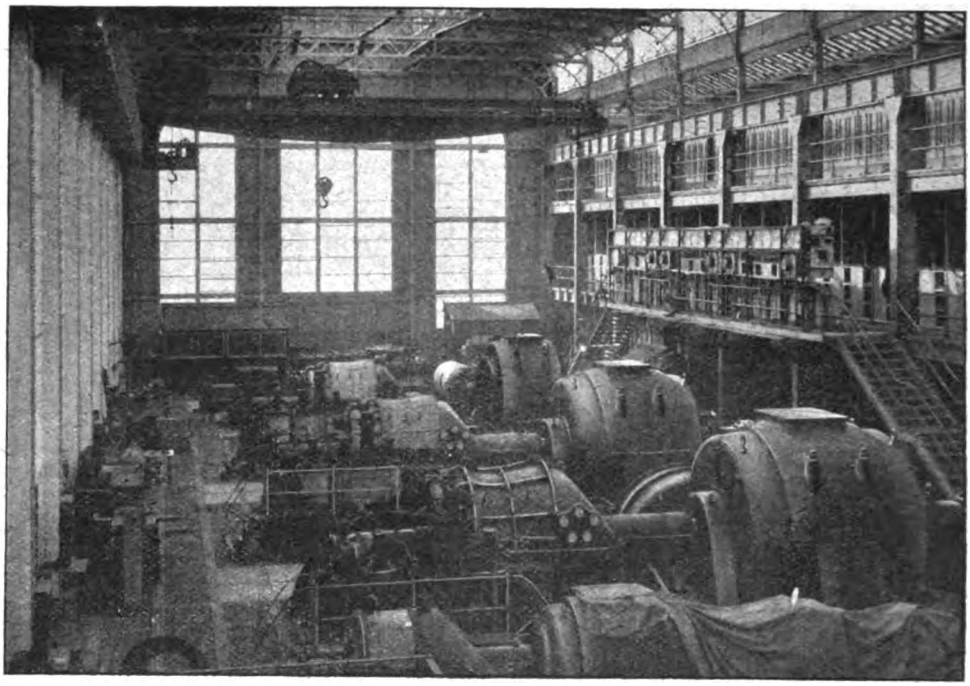
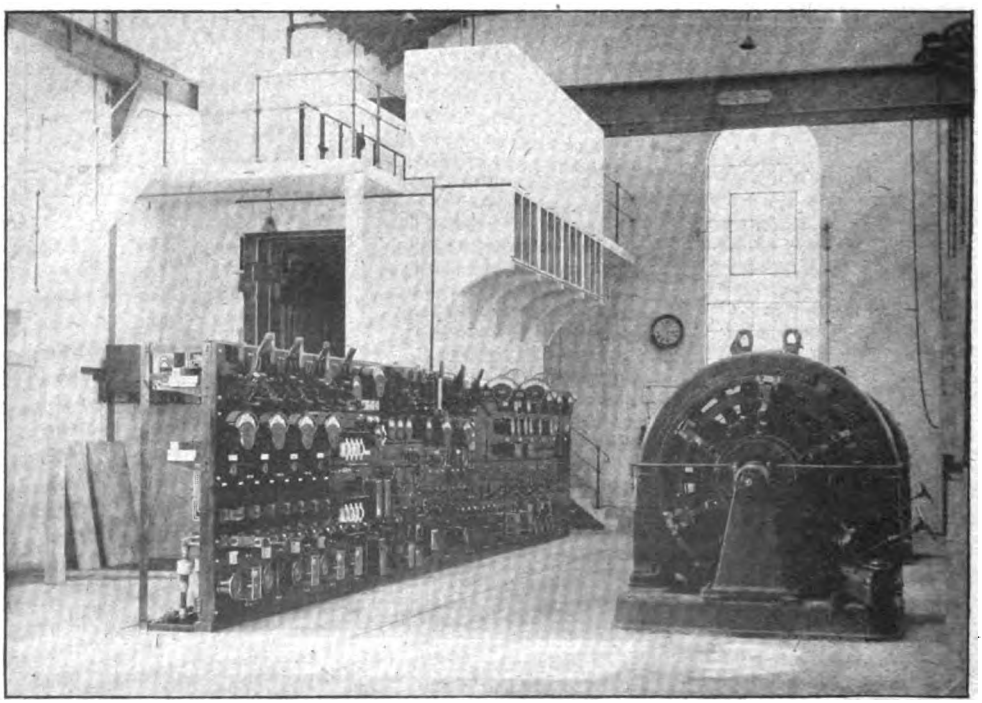


INTERIOR OF MAIN POWER HOUSE AT STONEBRIDGE PARK.



ACTON SUB-STATION.

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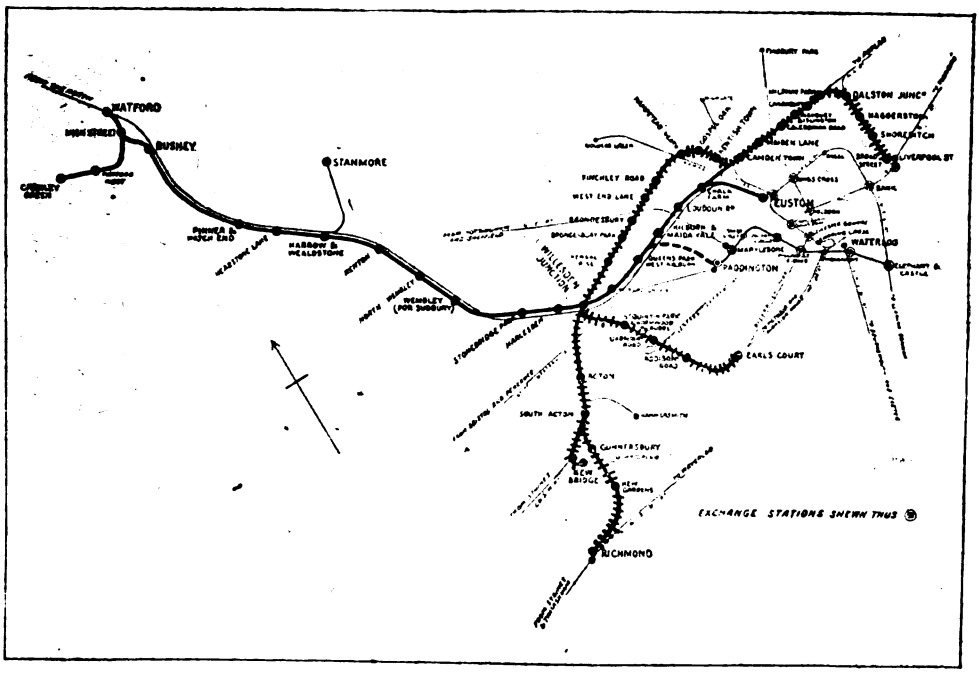
following particulars of the works so far available will be of interest.

The scheme is a development of an earlier proposal including an underground line between Kilburn and Euston; but as an alternative a connection was made from Queen's Park to Paddington, and has been in service for some time, with the "Bakerloo" section of the London Electric Railway while the Euston route is to be provided for by separate electric lines from Chalk Farm to Queen's Park, involving the two new single line tunnels under Primrose Hill already mentioned, so that only between




MAP SHOWING SECTIONS NOW EQUIPPED FOR ELECTRICAL WORKING.

Euston station and the top of the Camden bank will electric trains require to use originally existing lines.

London Electric trains have been working through over the London and North Western Railway from Queen's Park to Willesden Junction since May 10th, 1915, using the additional tunnels near the new station at Kensal Green (not yet open for traffic) while London and North Western Railway electric trains have been working the Earl's Court–Willesden Junction section since May 1st, 1914. The two new single-track tunnels at Kensal Green, each 16 ft. 4 in. in diameter, are the largest in this country which have been constructed by the shield method. At Queen's Park the station is being entirely reconstructed, and we have already described the London Electric side of the station and the new car sheds erected there.

Conductor rails are laid throughout most of the lines north of Willesden Junction, but unless London Electric trains of joint stock vehicles adapted for the higher speeds which will be required on the open air sections are introduced earlier, there is not much need for commencing electric working until the Euston route is available. Work has, therefore, been concentrated for the time being on the Broad Street–Richmond and Kew Bridge route *viâ* Hampstead Heath. On the North London route the fast lines only are fully equipped at present.

The standard rolling stock to be employed comprises three-coach and six-coach trains, each three-coach train consisting of a motor-coach, a trailer, and a driving trailer, with control on the multiple unit system. The electrical equipment of the first four trains has been supplied by Siemens Bros.' Dynamo Works, Ltd., and for the remaining trains by the Oerlikon Company. The first trains used on the Willesden–Earl's Court section were supplied by the Metropolitan

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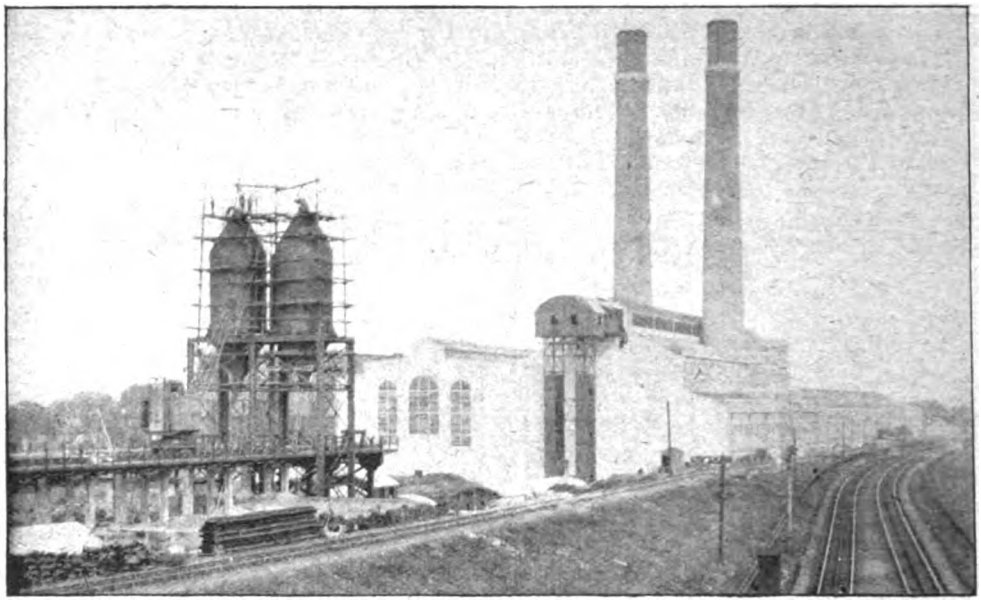

POWER HOUSE EXTERIOR.
South-west face.

A PIONEER TRIP.
Arrival of the first electric train from Broad Street, at Richmond.

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Carriage, Wagon and Finance Co., and had Siemens equipments; the Metropolitan Carriage Company is also building new standard motor-coaches, while trailer and driving trailer coaches are being constructed at the London and North Western Railway Carriage Works at Wolverton. Certain improvements have been incorporated in design, and the electrical equipments, while generally similar, are being supplied by the Oerlikon Company as mentioned.

The special joint stock for working on the Bakerloo–Watford services is being built by the Metropolitan Carriage, Wagon and Finance Co., and will have equipments made by the B.T.H. Co. There are four 250 h.p. motors on each motor coach. As the platform level on the Bakerloo tube is lower than that at the main line stations, the special joint rolling stock which will have to work over both systems will be a compromise between the London and North Western standard and the Bakerloo standard, so that passengers on this stock will step up to the platforms on the main line and down to the platforms on the "Bakerloo" section.

LIEUT.-COL. F. A. CORTEZ-LEIGH, R.E., T.D.,
Chief Electrical Engineer,
London and North Western Railway.

The generating station is at Stonebridge Park. The plant here has now been at work for some time past, supplying power for the Willesden–Queen's Park section, also for the Willesden–Earl's Court trains, and for the lighting at Euston station. An initial capacity of 25,000-kw. is provided for. Adjoining are the main repair shops for the electric rolling stock. The general arrangement of the power station follows on usually accepted designs; the boiler house, with a central firing floor and overhead bunkers, contains twenty Babcock and Wilcox boilers, equipped with drop-link automatic stokers and coal-weighing machines, and designed to evaporate 25,000 lb. of water each per hour, and supply steam at 200 lb. pressure, superheated 200 deg. F.; the gases discharge through Green economisers to two 240-ft. chimneys.

Coal is delivered in wagons from adjacent sidings to two elevated coal roads, the wagons discharging their contents into hoppers underneath, which feed two tray conveyors, these in turn delivering the fuel into two bucket conveyors which pass up the end of the building and over the boiler-house bunkers, returning at practically the same level. The ashes are removed by a separate pneumatic discharge plant in the basement delivering to two outside storage bins.

The whole of the water required for the plant is obtained from two artesian wells, with compressed air lifts; this water is delivered to a large reservoir, over part of which a battery of eight wooden cooling towers has been erected. The same water is used for boiler-feed purposes after being passed through a softening plant.

The turbine room contains five 5,000-kw. Westinghouse-Siemens three-phase turbo-alternators delivering current at 11,000 volts and 25 cycles. An auxiliary low-voltage

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set is installed for driving auxiliary machinery and for lighting purposes; this consists of a tandem set, including a 500-kw. 440-volt alternator and exciter, and a 120-kw. 220-volt direct-current machine. In the ordinary way the auxiliary a.c. station motors will be supplied through transformers from the main bus-bars, but, when the large units are shut down, the small set can be utilised for this purpose, or for supplying through step-up transformers to the sub-stations.

There are eleven sub-stations respectively situated at Stonebridge Park (in the power house), Bushey, Headstone Lane, Kenton, Willesden, Queen's Park, West End Lane, Dalston, Broad Street, Acton, and Camden, though not all are yet required. A standard equipment consists in most cases of three rotary converters, of either 750 or 1,000-kw. capacity, nine single-phase static transformers of the Berry oil-cooled type, a storage battery and automatic reversible booster of the Entz type. The Camden sub-station is the old gas-engine power station reconstructed; this plant has for some years supplied energy for lighting purposes to Euston station, for which service three rotary converters are now employed, while for traction purposes three large rotary converters are being installed. It is intended that the small generating unit at the main power station shall supply the current for lighting through this sub-station when the big units are shut down and the electric trains not running.

The rotary converter equipment, including in all six 1,000-kw. and twenty-five 750-kw. rotary converters of the self-synchronising type, has been supplied by the British Thomson-Houston Company, who also supplied the main high tension switchgear at the power house. The sub-station switchgear, both H.T. and L.T., has been provided by the British Westinghouse Co. The batteries are of the Tudor Accumulator Co.'s make and the boosters were supplied by Messrs. Bruce Peebles and Co.

*Photo*] ]*Elliott & Fry.*

MR. E. F. C. TRENCH, M.INST.C.E.,
Chief Engineer,
London and North Western Railway.

The high tension feeder cables, which are of the three-core, paper-insulated, lead-covered and armoured type, were supplied by the British Insulated and Helsby Cables, Ltd. Electrical equipment of the tracks naturally conforms to that of the various connecting electric railways over which running powers are exercised. Outside positive conductor rails are employed, at about 600 volts pressure, to supply the collecting shoes on the trains; a negative rail is provided between the running rails, and the latter may be used for track circuiting and automatic signalling. The conductor rails, of special low carbon steel, having about six-and-a-half times the resistance of copper of the same sectional area, weigh 105 lb. per yard. Trailing ramps are of cast iron, and the leading ramps on through lines are of forged steel, and in some cases, as on sidings, of special cast steel. The

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TRACK CONSTRUCTION AND OERLIKON THREE-COACH TRAIN.

jumper cables and the L.T. feeder cables were supplied by Messrs. W. T. Henley's Telegraph Works Co., and are in most cases paper-insulated, bitumen-sheathed cables laid solid in bitumenised-fibre troughing. They are mounted on Doulton porcelain insulators, which are fixed by malleable iron clips to the sleepers, whilst, to prevent creeping, anchor insulators are provided at intervals. Bonding is effected at each joint by four flexible copper bonds, with drop forged heads fixed in place hydraulically. The insulation of the cables is sealed by patent sealing terminals designed by Lieut.-Col. Cortez-Leigh, Chief Electtical Engineer, London and North Western Railway). In some cases rubber-insulated bitumen-sheathed cables laid in wood troughing in the ballast have been used. New car sheds for the electrical rolling stock have been erected at Willesden Junction and near Croxley Green.

The whole of the electrification has been designed by Lieut.-Col. F. A. Cortez-Leigh, R.E., T.D., Chief Electrical Engineer, London and North Western Railway, who is now serving with His Majesty's Forces. The work has been carried out, despite many difficulties and hindrances due to the war, by the staff of the department. On the civil engineering side, the work is under the direction of Mr. E. C. Trench, Chief Engineer.

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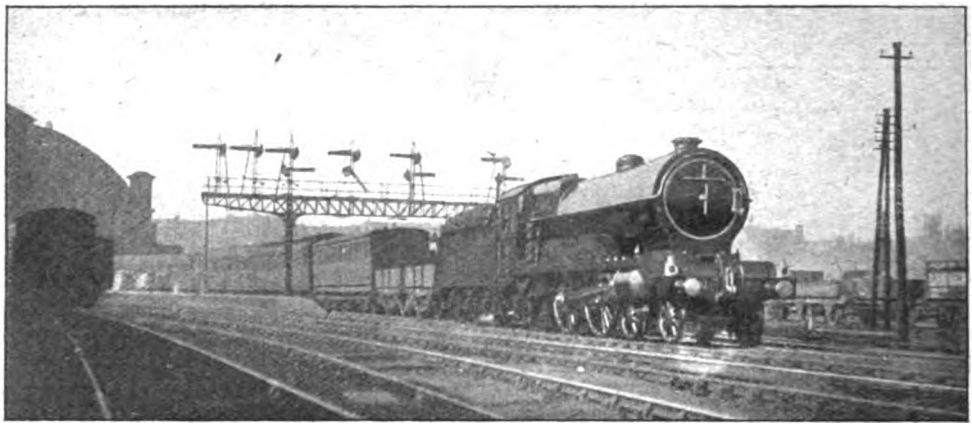

*Photo*] [*K.A.C.R. Nunn.*

NORTH BRITISH RAILWAY.

East Coast express leaving Aberdeen ; 4–4–2 engine No. 872 *Auld Reikie.*
Showing white-painted lamps for standard code (day use).

# Destination and Route Indicators.

By J. FRANCIS.

ON several occasions articles have appeared in the RAILWAY MAGAZINE dealing with head codes and route indicators ; but in order to meet the desires of several readers, and in view of changes during recent years, a further short article is justified, especially as the subject is one of continual interest.

British railways cover two distinct policies in this connection, one of merely classifying trains, the other of indicating particular destinations or routes. The former depends upon the maintenance of correct train order, the use of code whistles at stations preceding a diverging point so that the signalman can telegraph as to the required route, and the sending of advices ahead concerning extra trains or trains out of order, the signalman otherwise giving preference to one train over another according to classification or instructions. This works very well, in practice, on lines which are not of too involved a character ; and it is surprising how well even complicated traffic can be conducted with only the usual nine indications of the "Standard" code. Moreover, several railways which use special head codes in the suburban areas, adopt the standard code elsewhere, and the practice certainly conduces to uniformity.

On the other hand, on lines where there are many junctions and inter-connections in suburban and similar areas, there is every justification for the use of special head codes, and these provide most material of interest when this subject is considered. The railways principally concerned in this way are the London and South Western, South Eastern and Chatham, London, Brighton and South Coast, Caledonian and Highland, which do not use the standard code ; the Great Eastern, which employs it outside the suburban area ; and the Metropolitan, Metropolitan District and tube lines and a few others which include special features.

First as to the standard code. As space will not permit of an extended series of diagrams, it is thought best to present the subject by positions. Fig. 1 covers the positions of the standard code. On many lines lamps are used both by day and night, though for day use, whether the lamps are black or with dark red or green sides to harmonise with the scheme of painting of the engine, it can hardly be contended that they are easily visible against the dark front of the engine smokebox. However, this does not appear to occasion any particular difficulties, and is therefore presumably fairly satisfactory in practice. It is, however, recognised by at least one railway, the North British, that if unlighted lamps are to constitute a head code they should be made properly distinctive, and therefore the lamps are painted white, and kept in at least fairly good condition for this purpose. Where

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discs are regularly used, as on the Great Eastern Railway, white ones are used to indicate lamp positions, and this course is decidedly commendable as there can be no doubt whatever as to the indications. On the London and South Western Railway, although the standard code is not used as a whole, it is employed with white discs during daylight when working on to other lines, as beyond Exeter, for running over the Great Western Railway, and between Dorchester and Weymouth, though to Oxford or in other exceptional cases lamps alone are employed.

Four positions only are required for the standard code and, with reference to Fig. 1, these are as follows :

(*a*) Express Passenger Train. Positions 2 and 4.

(*b*) Ordinary or Stopping Passenger Train. Position 1.

(*c*) Express Fish or Fruit Train, composed of passenger stock. Positions 1 and 2.

(*d*) Empty Coach Train. Positions 1, 2 and 4.

(*e*) Fast Express Goods Trains and Fish and Meat Trains composed of goods stock. Positions 1 and 4.

(*f*) Express Cattle or Ordinary Express Goods Trains. Positions 1 and 3.

(*g*) Light Engine or Engine and Brake. Position 2.

(*h*) Through Goods and Mineral Trains. Positions 2, 3 and 4.

(*i*) Ordinary Stopping Goods Trains. Positions 1, 3 and 4.

All these are represented only by white lights at night, and on certain railways where more elaborate codes are also in use, including the use of green lights, variations of the standard codes are adopted to indicate specific destinations of trains which otherwise would all carry the same standard code. Thus on the Great Eastern Railway, empty trains with lamps in positions 1, 2 and 4 may have one, two or three of them green, to indicate which sidings they are bound for, or a platform at Liverpool Street.

It is, however, when one deals with railways which do not confine themselves to the standard codes that most interest is afforded. Originally no doubt such codes were adopted on the principle that a white disc with a red cross should mean one thing, with a

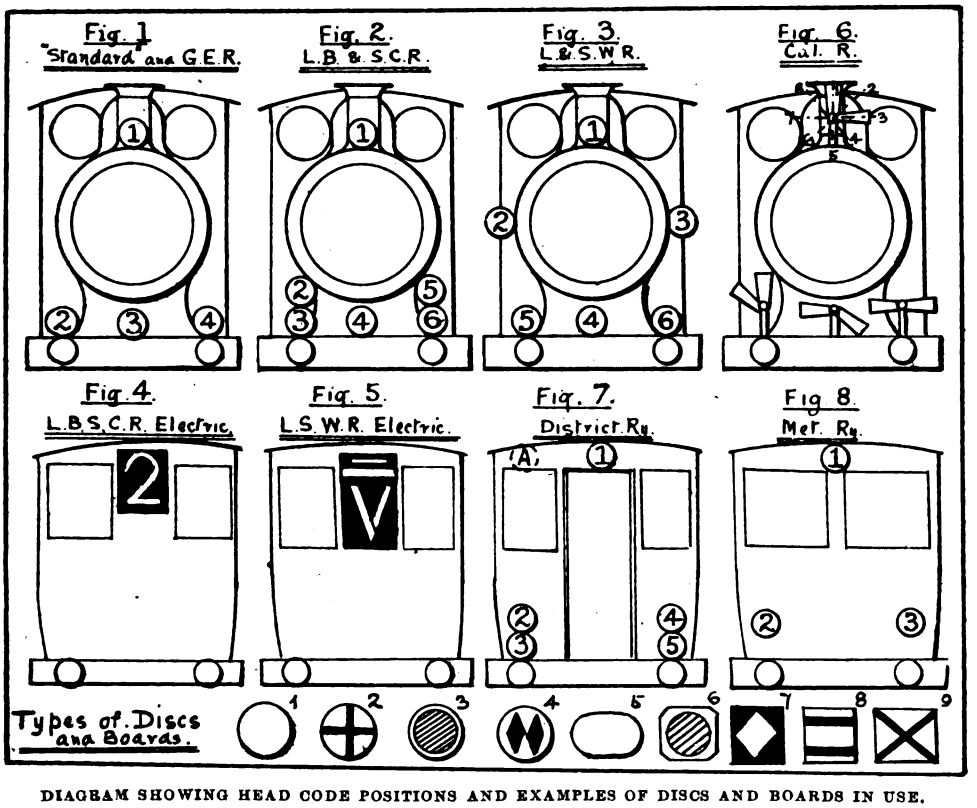


DIAGRAM SHOWING HEAD CODE POSITIONS AND EXAMPLES OF DISCS AND BOARDS IN USE.

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black cross another, and a green cross a third, while square boards with white or black diamonds, one on two vertical or horizontal stripes, black, green or red discs with white border, and single or double diamond discs provided for other purposes. But on most railways of any size requirements have gone far beyond the resources of the variations thus available, and it has become necessary not only to utilise various locations of these discs and boards, but also to employ combinations of them.

Where such is the case and where various routes are involved as well as a wide range of destinations, the result is often somewhat bewildering. But the great drawback is that as crosses, squares, stripes and diamonds cannot be represented by lamps, an entirely new series of indications comes into force as night falls. For this reason two of the railways which had the most complicated codes, the London and South Western and the London, Brighton and South Coast, gave them up a few years ago and adopted new schemes with day equivalents to white and green lamps. But whereas the Great Eastern had already adopted the natural equivalent to a green lamp—a green disc, with white rim to make it stand out—the London and South Western Railway introduced a white diamond for green, and the Brighton line a black cross disc for the same purpose. Neither is suggestive of green, though that may be a detail, and the white diamond is not easily distinctive from a white disc at a distance. However, these codes have justified themselves in use, and it will be sufficient to refer to the varying positions adopted.

On the Great Eastern Railway the four positions of the standard code alone are used, as in Fig. 1. With white lamps further positions are available, with one white at 3 or 4, two at 2 and 3 or 3 and 4, and three at 1, 2 and 3. Four white lamps, at 1, 2, 3 and 4 is reserved for Royal trains. With one or more of the lamps green the whole range of positions is available in various combinations, but for special trains a green disc or lamp is added to the appropriate standard code, and for this there must be a recognised position. Thus a special express passenger train has the green at 3 between whites at 2 and 4; slow passenger, white at 1 and green at 3; while where three lamps are employed for the standard code, the green must necessarily take the fourth position vacant. It is remarkable how wide a range of indications is available with these four positions and white or green discs and lamps. Incidentally, the Great Eastern Railway makes its code serve for a complicated series

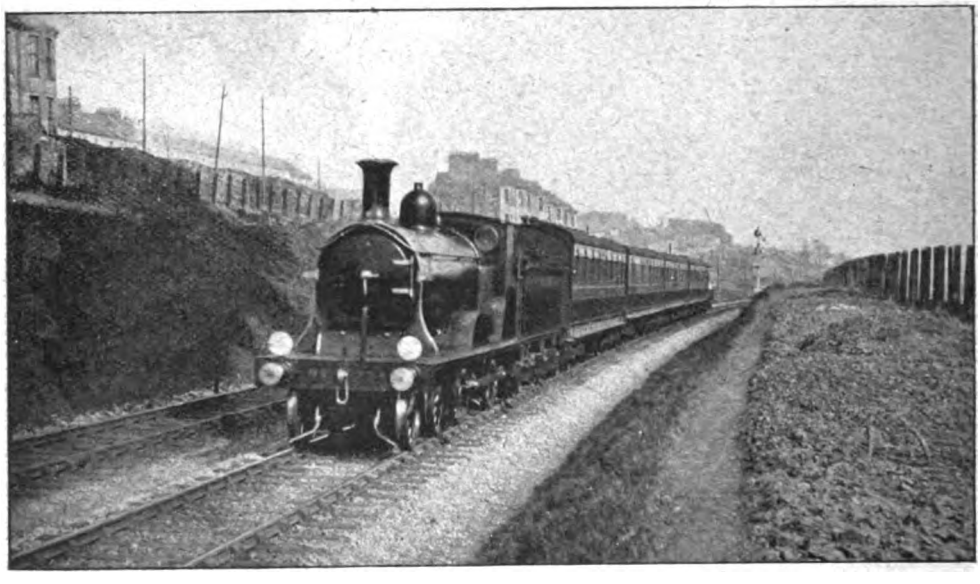

*Photo* [*Lieut. B. D. Hilberton, R.N.*

LONDON AND SOUTH WESTERN RAILWAY.

Train near Lipson using white discs in accordance with the standard code for working over a section of the Great Western Railway.

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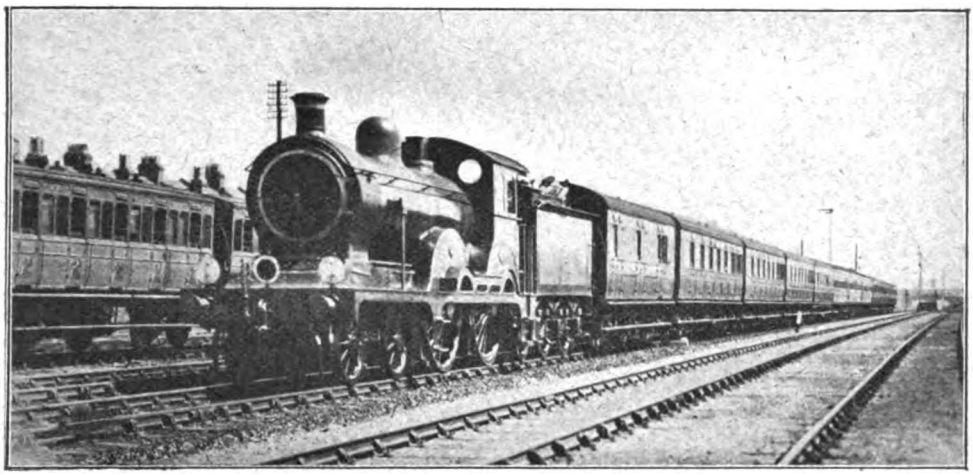


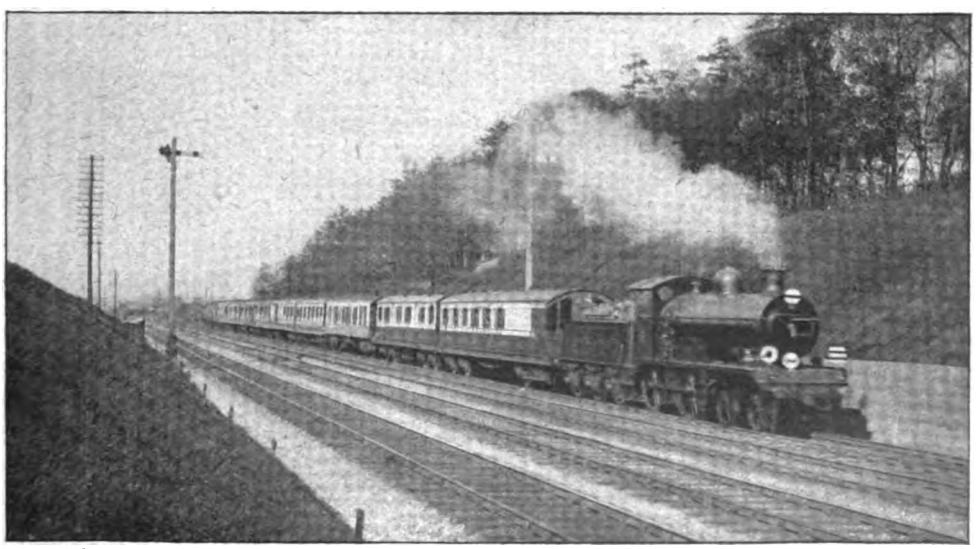
*Photo]* GREAT EASTERN RAILWAY. *[F. E. Mackay.*

Relief Cromer restaurant car express, showing use of green disc in addition to the two white discs of the standard code.

of goods train journeys, and also provides for a few indications as to whether fast or slow lines are to be traversed, while in addition empty trains to Liverpool Street for the main line platforms usually carry a specific head code—mainly of green lights—according to platform required.

Obviously it is not necessary to provide as many separate indications as there are requirements, for the same code may do duty for several purposes, as long as trains bearing it can never come together. Thus Fenchurch Street–Blackwall and Liverpool Street–Woolwich both have a single green light at 1; Fenchurch–Woolwich or Royal Albert Dock *viâ* Bromley and one of the Liverpool Street–Ilford codes both use greens at 2 and 4; Liverpool Street–Loughton (*viâ* local lines) and Liverpool Street to East London Railway (*viâ* fast lines and now only used for special trains) have greens at 1 and 3; and many other cases could be cited.

A feature of the Great Eastern code is, too, that to a considerable degree indications are



*Photo]* LONDON, BRIGHTON AND SOUTH COAST RAILWAY. *[G. E. Ellis.*

An elaborate head code as used before the present system was adopted.

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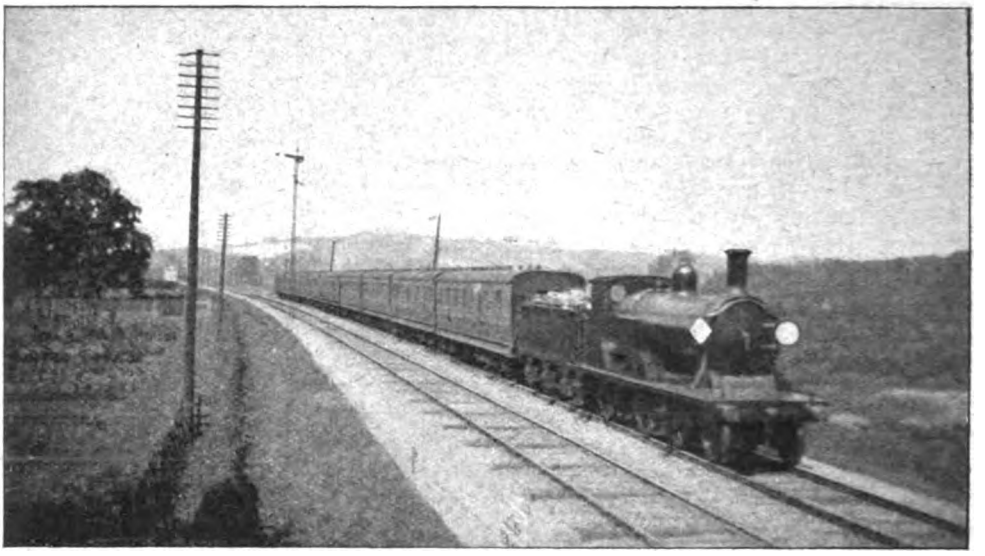

*Photo]* [*K. T. Smith.*

LONDON AND SOUTH WESTERN RAILWAY.

Train showing use of white disc and white diamond (gre n light) for head code.

systematised. Thus Ilford codes largely consist of combinations of green and white in positions 2, 3 and 4; trains *viâ* the Fairlop loop *viâ* Woodford have three whites at 1, 2 and 3, while *viâ* Ilford the positions are 1, 3 and 4, except that at 4 a green lamp is used as the indication would otherwise be that of an ordinary stopping goods train, standard code. Some of the variations apply according to whether fast or slow lines are used between Stratford and Liverpool Street; thus a fast line Loughton train with greens at 1 and 3, removes the green at 1 between Liverpool Street and the first or last station stopped at on the branch.

An economy of head codes is also obtained by using the one indication whether a train proceeds to the limits of the code or terminates at some station on the way. Very occasionally the same code may be allowed to clash in two interpretations. Thus Fenchurch Street–Fairlop and Liverpool Street–Fairlop trains either way bear the same code, and may clash near Stratford. At the same time there are only two or three of these trains from Fenchurch Street *viâ* Woodford, while *viâ* Ilford the Fenchurch Street trains usually approach Stratford over the fast lines, so that the possibilities of confusion are very slight.

A further economy is effected by making some of the codes apply for up trains irrespective of where the train has come from. In this way the down Fairlop codes are unnecessary for up trains, and the Ilford codes are simplified, thus releasing one or two codes for empty trains to Liverpool Street.

But not a great deal is done in this way, and, speaking generally, the Great Eastern codes combine with the standard system for a clear and distinctive series of indications satisfying all requirements both as to destination or origination and as to route or whether fast or local lines are specified on the multi-track section to Liverpool Street. The Great Eastern Railway is almost the only railway which still adheres to the use of a red light on single lines, and for this a red disc with white rim serves for day use. Where more than one destination is possible, as between Ongar and Epping, the remaining white or green light or disc of the code serves for differentiation. The red is usually placed at position 1, other lights of the code being as usual. Shunting engines on this line carry one white and one red lamp at positions 2 and 4, at both ends.

Fig. 2 indicates the lamp positions used on the London, Brighton and South Coast Railway. There are six available, with the peculiarity that over each buffer two lamps or discs can be placed one over the other. Some of the codes are fairly simple, but in view of the complicated series of routes to be provided for, particularly in the suburban

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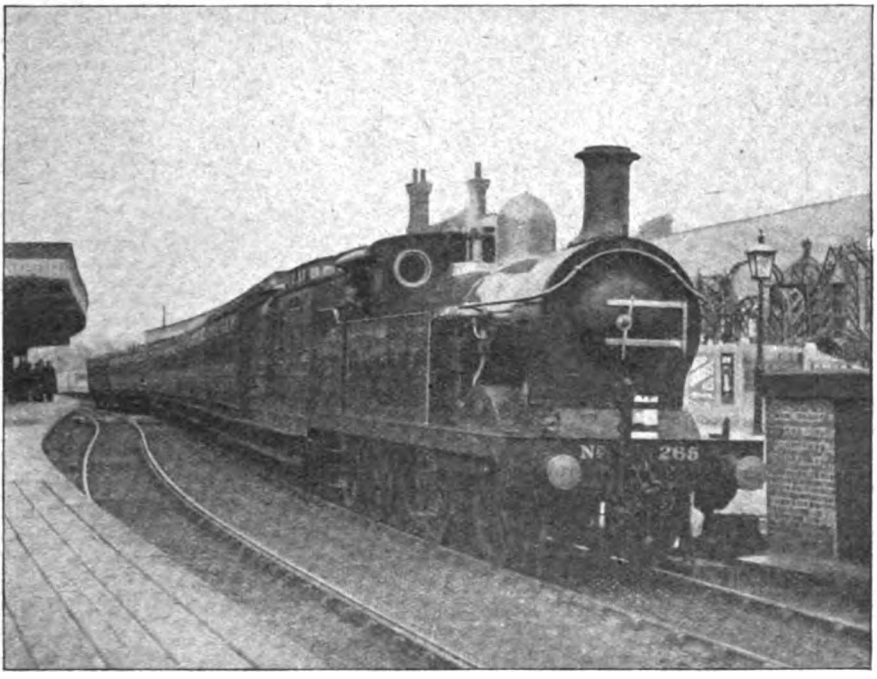
area, others are somewhat elaborate. The standard code is not used at all on this line, and generally there is also a lighted lamp by day, as so many routes involve the passage of one or more tunnels. For special trains a double diamond disc is sometimes employed. An illustration reproduced on page 237 sets forth the present day "Brighton" system; a complicated example of practice in the past is shown on page 233. On the electric services a system of large numerals—1, 2, etc.—is used to distinguish the respective routes operated, as shown in Fig. 4.

On the London and South Western Railway six positions (Fig. 3) are available for the white discs and lamps and white diamonds and green lamps, but only four are regularly used for their own purposes. These are numbered 1, 2, 3 and 4, thus giving four diagonal positions and two straight lines. For special trains a black disc with white rim is placed at 6 (purple light at night), the code otherwise being that for route or destination. Positions 5 and 6 are only used when the white discs have to be placed according to the standard code, as on the Great Western Railway beyond Exeter (Queen Street) and to Weymouth. A feature of London and South Western head-code practice is that empties and engines going up to Waterloo carry the head code which the trains will bear on departure. This is useful for guiding the signalmen as to the identity of empty trains and of light engines. For the new electric services the letter code set forth in recent issues of the RAILWAY MAGAZINE is employed (Fig. 5), and this will be extended in due course. The use of a horizontal stroke above the code letter to distinguish trains leaving Waterloo *viâ* Richmond from those on roundabout routes proceeding the other way, is a feature of interest. As the letters are illuminated at night the indication is, of course, the same. Metal plates cut stencil-fashion are fitted in slides over an opal glass which shows white by day through the cut-out portions and through which light from electric lamps behind shows at night. Incidentally, the plain opal sheet at the rear end is a good indication of "Last Vehicle," and corresponds with the practice



*Photo*] [*G. E. Ellis.*

SOUTH EASTERN AND CHATHAM RAILWAY.

Caterham train showing head code for day use.

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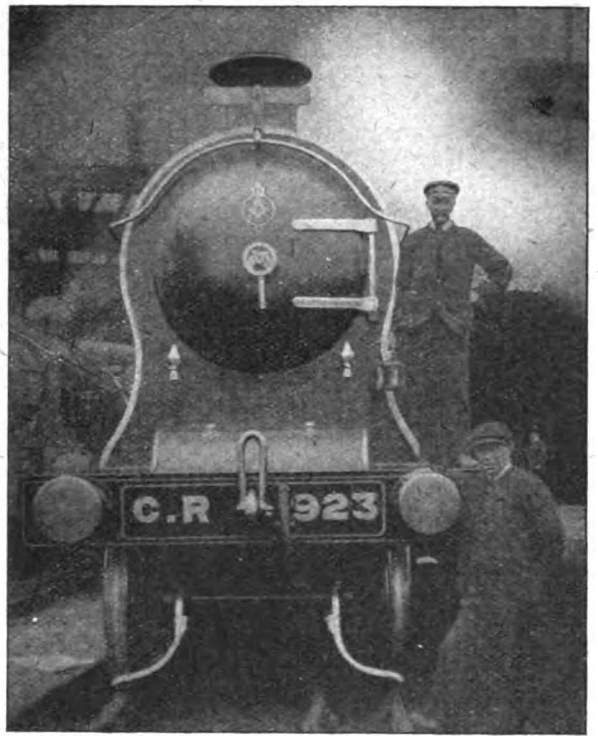


*Photo*] [*A. Dunsmore.*

ROUTE AND DESTINATION INDICATOR AS USED ON THE CALEDONIAN RAILWAY.

of the Lancashire and Yorkshire Railway in this respect.

On the South Eastern and Chatham Railway the use of discs and boards with crosses, stripes and diamonds is still retained, and works fairly simply for the main line services, though in the suburban area the variety of routes and destinations introduces many complications and relatively bewildering features. In addition, during the busy periods, as trains may sometimes come close together off or for the same routes, the code is sometimes amplified by large numeral boards showing whether the train is No. 1 or No. 2. Special number boards for this purpose are carried by many engines, but occasionally a chalked board has to do duty.

It is mainly on the South Eastern section that the complicated head codes are seen, the Chatham section being simpler. For special purposes a large oval white board is sometimes employed. The great drawback of the system in force is that after dark white or green lamps have to be employed; but there is some justification in the retention of the other system for day use in that the more complicating features of differentiation apply largely to the day period, and it is not usually necessary to classify so extensively at night, at least on the passenger side.

The Caledonian system of semaphores (Fig. 6) is peculiar to that line, and applies mainly to trains working in the Glasgow district. As noted in the diagram, 8 positions are available for the two arms, including one closed upon the other, so that a wide variety of indications is available. Further, as the semaphore can be placed over either buffer or in the middle of the buffer beam, three additional sets of indications are available. Here also an entirely different code is necessary at night.

For ordinary purposes, outside the Glasgow area, lamp positions suffice, and this line, with the Highland, is peculiar in that they are usually at the foot of the chimney, and on either side of the cab.

On the Underground lines in London, lamps are almost entirely used. For electric trains on the District line the recesses for the lamps are painted white, and covers are fitted over those not required. Five positions are available as shown in Fig. 7. On the Metropolitan Railway, no special means of showing up the lamps is adopted for day use, and blue lights are employed to some extent. Only three positions are adopted (Fig. 8). Both railways adopt the practice of showing destination only, without reference to origination, so that up and down lines have distinct codes. On the District line a rather confusing feature is that the top light is sometimes in the middle and sometimes at A (Fig. 7), according to how the coaches are fitted, so that codes including the top light may appear different, without actually being so. On the tubes a simple headlight usually suffices, and frequently one of these is electric with an emergency oil lamp alongside. The Waterloo and City section of the London and South Western Railway is peculiar in that both head and tail lights are red.

A few railways employ special head codes

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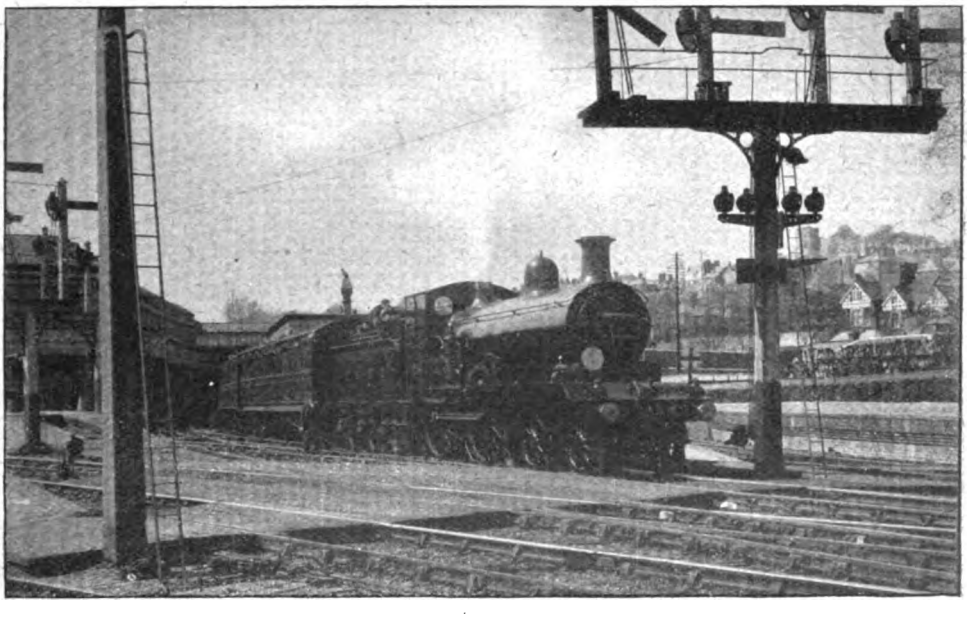
in certain areas. Thus, on the Midland a blue light or a square board with blue disc is sometimes seen. Rectangular boards with black cross placed diagonally are also employed, and on the Tilbury section the characteristic square board with the letters "L. T. & S." occasionally figures in the code by being reversed to show a white cross on a green ground, or a green cross on a white ground. Otherwise the white disc with red cross is the usual identification of Upminster route trains.

Complications of traffic owing to the war have caused considerable extensions of the practice of identifying trains by number boards fixed below the chimney. This is a good feature, though it has often been done at times of pressure when many additional relief trains are run. It has been suggested that the number system might be adopted with advantage as the standard practice instead of head codes, all trains carrying the number they bear in the working time table. This might be practicable for long distance trains, especially if a system of "built-up" numbers fitted into a holder were adopted; but otherwise would be very difficult in view of the series of numbers engines would have to carry, all perhaps thrown out of gear if an alteration of duty is made. The high figures necessary on many lines would be a drawback, while suggestions to introduce black, red or blue series, or to classify in districts would probably only lead to confusion. Further, it would be difficult in this connection to adapt the same system for night use, at any rate so as to supercede the necessity for classification of head codes on existing systems.



*Photo*] [*G. F. Burtt.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

Eastbourne train at Lewes, showing head code consisting of white and black cross (green light) discs.

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# Railway Literature.

STATE REGULATION OF RAILWAYS IN THE SOUTH. By Maxwell Ferguson; and RAILWAY MONOPOLY AND RATES REGULATION. By R. J. McFall. [Publishers in England, Messrs. P. S. King & Son, Ltd. Prices respectively 7s. and 8s. net]. These volumes have been issued by the Columbia University, of New York, where both authors are, or have been, professors on economic subjects. The former is concerned mainly with United States railways east of the Mississippi and south of the Ohio railways, with introductory chapters on charters, early laws, constitutions, and recent general railway legislation, leading up to the real subject matter of the monograph. The bulk of the book considers the railways of the various States individually. The second volume is described as a study "to present the general theory involved in what is understood by Railway Commissioners as the cost-of-service principle in rate regulation." Both works are essentially studies in economics, and being concerned entirely with conditions in the United States have only indirect usefulness to British readers. For students they are, however, well worthy of perusal and study and as such they may be commended.

* * *

THE RAILWAY LIBRARY, 1915. [Compiled and edited by Slason Thompson, Bureau of Railway News and Statistics, 1529, Railway Exchange Building, Chicago. Price one dollar]. Following the approved practice of its predecessors, the seventh annual issue of *The Railway Library* prefaces the more noteworthy addresses and papers of the year 1915 with several articles descriptive of early railroading in the United States. The story of how 186 separate original companies have been finally consolidated into what is now the New York Central Railroad furnishes a concrete example of the evolution of American railways from the primitive rails, bridges and engines to the modern tracks, viaducts and monster enignes shown in the illustrations. A brief sketch of the life of the late James J. Hill, whose career was contemporaneous with railway extension into the far west, falls naturally into the historical section of the *Library*. Then follow brief reviews of the railway situation in Europe, in its operative, financial and economic aspects. This leads to a discussion of the preparedness of American railways to handle "a state of war" in the United States, to which the editor adds the suggestion that the question of co-ordination of railway control in such an emergency has been solved in Great Britain without sacrificing any of the initiative and experience of private ownership. The question of Government regulation of the railways and the necessity for bringing them all under a single national authority is discussed from every angle, and notably by Mr. Otto H. Kahn in his paper on "The Government and the Railroads."

As in former issues, the concluding chapter of *The Railway Library* consists of the annual report of the Bureau of Railway News and Statistics, in which is presented the latest information in regard to American and foreign railways.

* * *

A PUBLIC SERVICE OF RAILWAY AND CANAL TRANSPORT. Price 1s. This booklet is described as a "Study Prepared in the Fabian Research Department," and published by the Fabian Society and by George Allen and Unwin, Ltd. Naturally it is in favour of nationalisation of railways, and on the whole is carefully prepared. It is largely concerned with the terms of purchase, and in conclusion it is suggested that "by the substitution of the supreme credit of the State for that now enjoyed by the different railway companies—itself worth, it is estimated, 0·85 per cent. on the capital debt—and by the reduction of the present unnecessary duplication of stations, goods depôts, rolling stock, receiving offices, etc., etc., . . . such considerable annual savings can be effected as will meet the increased cost of working due to the improvement in the conditions of labour and the enhanced prices—with a margin for errors and contingencies of three or four millions a year—and leave a well-secured annual surplus for the Exchequer. This net surplus, even if we put it at no more than two millions a year, would, if applied continuously as a Sinking Fund of a 5 per cent. debt, extinguish no less than 2,500 millions sterling of debt by the year 2000." Certain factors are well argued; at the same time we must continue to join issue as to the main assumptions, such as those concerning duplication of stations, rolling stock, services, etc., as well as in regard to the general question of the alleged superiority of State management, and it must be considered as exceedingly doubtful whether, with the responsibilities due to existing railway capital, and the continued necessity for supplying or raising further capital for new works, there is much prospect of extinguishing the suggested millions of debt which the capital at present represents. State acquisition to enable the Government to do what railway companies cannot do is another question; and even then State management has not yet attained so high a reputation as to suggest vast possibilities in regard to economic and profit-earning aspects. However, this pamphlet may be commended to those desiring to follow up the subject from the point of view which finds favour with the Fabian Society and kindred associations.



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# British Locomotive Practice and Performance.

By CECIL J. ALLEN.

*Photo]* [*R. E. Thompson.*

LONDON AND NORTH WESTERN RAILWAY.
2.25 p.m. Whitehaven–Penrith train at Brigham station.
0-6-0 engines Nos. 3242 and 2317.

SOME rather important remarks from a valued correspondent concerning rail-joint timing are worth quoting. "Would it not be wise," he writes, "in the interests of accuracy, actively to dissuade the average amateur from using this method? No doubt you can work it satisfactorily yourself; but it is obviously much more difficult, and involves more care and knowledge of the road, than straightforward mile-post timing. I feel that the average amateur tends in any case to be not precise enough, and accuracy is so essential in a matter of this kind that one does not want any pranks. If you, for instance, were to quote records which any of your correspondents might make by this means, I should 'hae ma doots' about their authenticity, unless the correspondents were people of wide experience and proved accuracy in these matters, as doubtless many of your correspondents are. (I do not, of course, forget that you disclaimed responsibility for the results which your readers might attain by the rail-joint method.)"

"It seems to me almost more important, when on the subject of timing, to insist on the need for the utmost fulness and exactitude in all train logs on the part of your correspondents. Some of the latter which you have published have been so meagre that one cannot help feeling doubtful about them, especially if they are at all exceptional. Apart from the absence of important information in such cases, to record the time only at rare intervals gives the observer very little chance of spotting any little inconsistencies, or failures of the watch, whereas with a close and continuous series of timings any mistake (such as we all make sometimes) or failure is betrayed at once. I find myself that with a little manœuvring one can, even travelling third class, generally secure a view of the mile-posts, especially in these days of corridor carriages, and I feel that all logs, to be really satisfactory, should be based on the mile-posts, whether the observer has a chronograph or not. Of course in the latter case one cannot claim high speed records, but in every case the points timed should be as close together as is feasible with the kind of time-piece available, in order that any errors may be betrayed by the adjacent timings. No doubt you do a good deal of weeding out of correspondents' records as it is; I only raise the point of accuracy because collections of records are only of value when one is able to feel entirely sure of their sources."

I have published this letter because I know personally that my friend exercises



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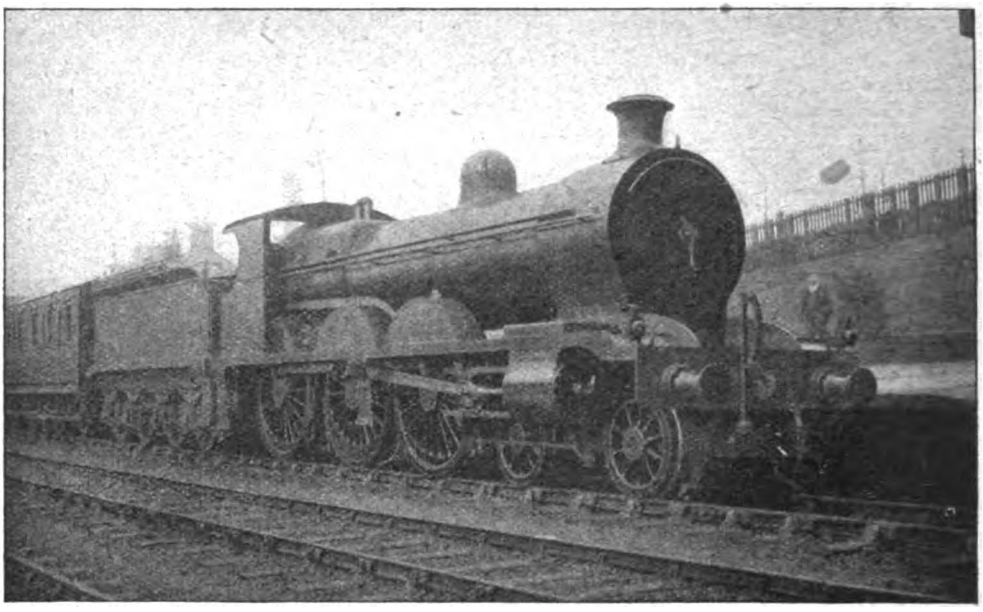

*Photo]* [*Rev. E. J. Robinson.*

GLASGOW AND SOUTH WESTERN RAILWAY.
South Express at Dumfries. 4-6-0 engine No. 381.

the most scrupulous care in the compilation of his logs, several of which I have been privileged to refer to in these columns. With his point of view I sympathise completely and cordially, and yet, although the principle cited is in the highest degree commendable, the doctrine is a very difficult one to enforce. Writers of these articles since their inception, myself included, have endeavoured to present "popularly" a technical topic, so that their value may not be confined only to those who, like my friend, make of locomotive running an extremely careful and scientific study. So far as I am concerned, it has been my object since commencing to write on "British Locomotive Practice and Performance" to encourage the widest possible circle of readers to take an interest in train-timing, and to submit their logs to me, if they care to do so, for criticism and also—if to all appearances reasonably accurate—for publication when conveniently possible. But I do not expect—it would not be reasonable to do so—that the average amateur is sufficiently engrossed in the operation of train timing to compile his records with the same minute attention to details that is found in my friend's logs. Indeed, a long apprenticeship to the work and a fairly close acquaintanceship with the road is necessary before such a result can be attained. My point, however, is this—that if our considerations of locomotive practice and performance were reduced to too exact a science, the result would probably be to detract largely from their interest to the general reader.

Consequently, while fully endorsing all that my friend has written, and while emphasising with him the necessity for as much accuracy as is possible in the recording of running, I should be sorry to discourage anyone who is making his earliest attempts. But any such I would advise to commence with starting, stopping and station passing times, leaving severely alone for a time the recording of maximum and minimum speeds. By far the greatest number of utter impossibilities that I find in correspondents' logs lie in the matter of maxima and minima, and I may, perhaps, be pardoned for citing a few recent samples. A writer the other day affirmed that, on a down Midland journey, "one complete mile was covered in 39 sec. exactly." The *venue* of this astounding effort was just south of Radlett on the down journey. Now a passing acquaintance with the articles in this and other periodicals on locomotive performance should be enough to convince any reader that a speed of 92·3 m.p.h. is only attained very rarely, and

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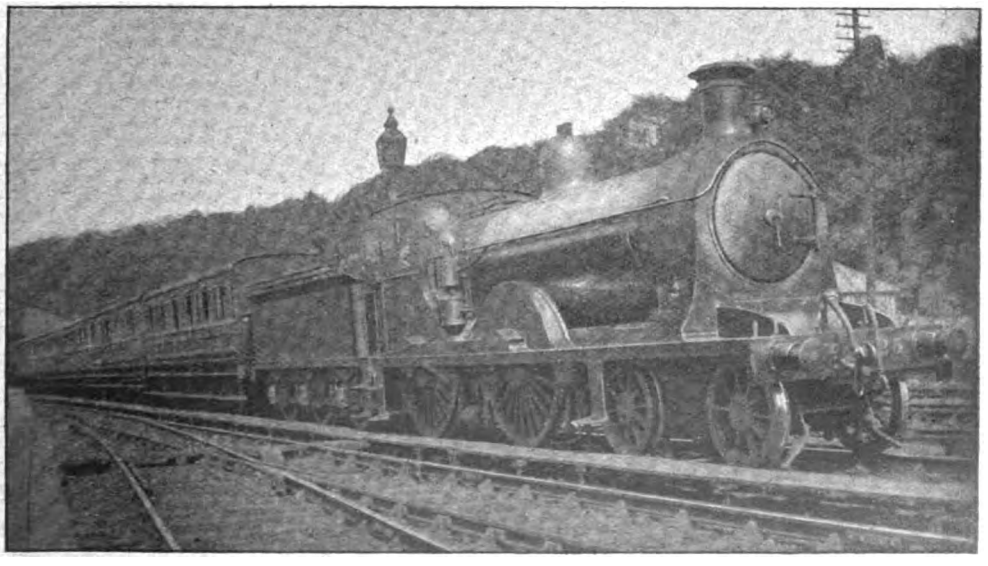
under the most exceptional conditions. Brief reference to published Midland runs would have shown that at this particular point speed scarcely ever exceeds 70 m.p.h. in the down direction, and is not always as high as that. Consequently it is fairly obvious that what was actually timed was not one mile, but ¾ mile, giving a speed of 69·2 m.p.h.—a slight difference.

This reminds me of another letter I received a long time ago, and which I have preserved since then with the object of referring to at some future date. I had been commenting on the extreme rarity of speeds of 90 m.p.h. and over—a fact with which anyone moderately well versed in locomotive work must be conversant—and this elicited a reply from a London and North Western correspondent who had had "a fair amount of experience of 'speed bursts.' Incredible though it may seem, I have recorded six times speeds of 90 m.p.h. and over, four of the records by 'Precursors,' one by an 'Experiment,' and another by a 4–4–0 superheater. The best of the 'Precursor' 90's was made by *Daphne*, with a load of 230 tons, on the 5 p.m. *ex*-Liverpool for Newcastle; then by *Harrowby* with 190 tons (9 a.m. *ex*-Liverpool for Newcastle), and by *Tiger* with 160 tons (6 p.m. *ex*-Liverpool for Newcastle) and by *Hyperion* with 150 tons. With 100 tons behind the tender, I have timed an 'Experiment' at 91 m.p.h., and, lastly, a 'George the Fifth' class engine at 93 m.p.h. with 210 tons." The letter goes on to detail 25 other lightning sprints, ranging from 80 to 89 m.p.h., with the same type engines, and then proceeds, "One of my best records is that made by a 0–6–0 goods engine on the London and North Western Railway. This engine, with wheels of 5 ft. 2½ in. diameter and a load of 225 tons, maintained for 6 miles a speed of 80 m.p.h. down a gradient of 1 in 105. One of the 4–6–0 mixed traffic engines of the same railway and same wheel diameter I have timed at 81 m.p.h. with a load of 220 tons. After this my best is a speed of 75 m.p.h. by a 2–4–2 tank (L. & N. W. R.) with a load of 160 tons. I consider this extremely good for an engine with a wheel diameter of 5 ft."

Now, "incredible though it may seem," the above data purport to relate to the descent from Standedge Tunnel to Huddersfield, on the London and North Western Liverpool–Leeds main line, and did such figures even remotely approximate to accuracy, it would be nothing short of a miracle that the writer remained alive to tell the tale. As I endeavoured to point out to him, the speed of all the records I have over that section—a fairly numerous collection—average a maximum rate of barely over



*Photo]* [*W. F. Anderson.*

NORTH BRITISH RAILWAY.
10.32 a.m. Edinburgh–Galashiels train, *via* Peebles, at Galashiels.
Holmes 4–4–0 engine (rebuilt) No. 325.

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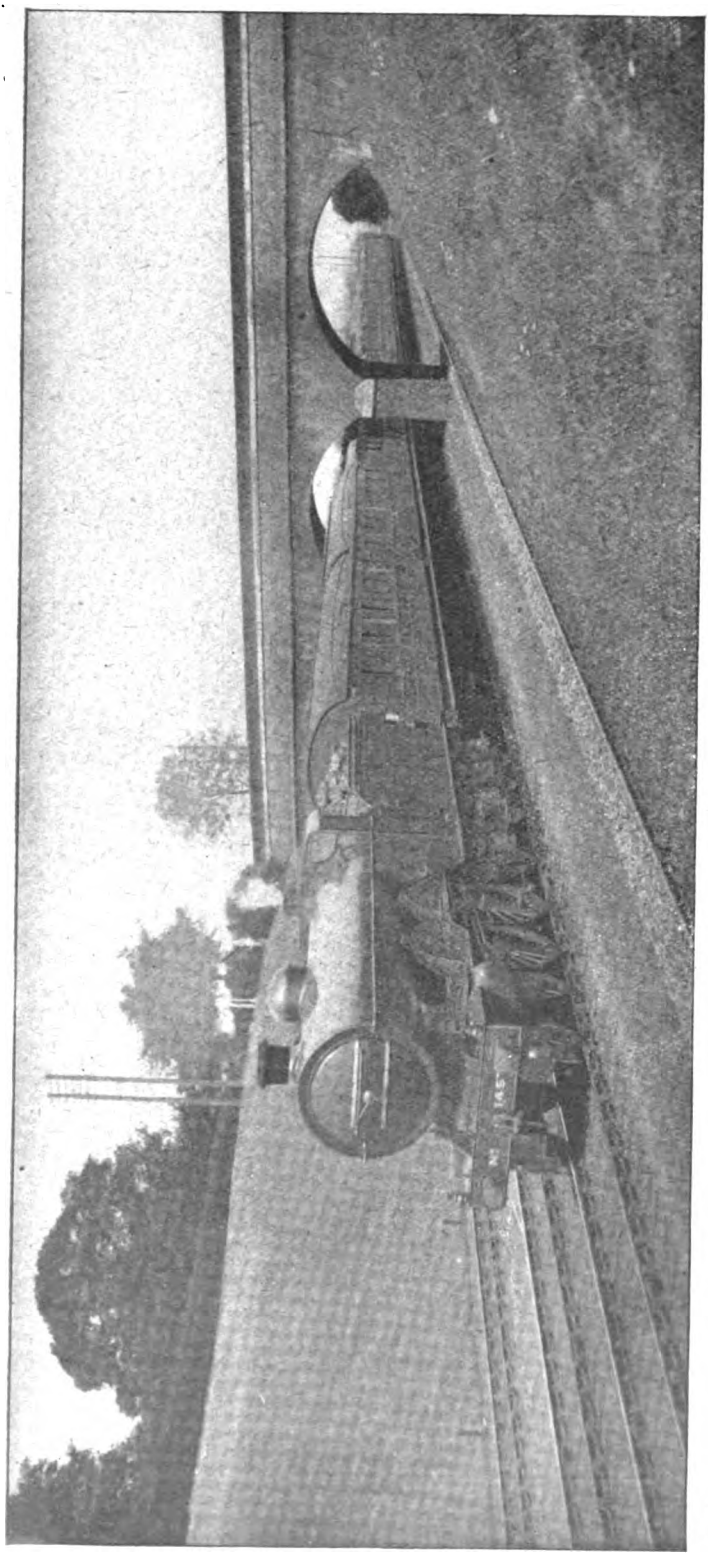

[Photo] [Harold R. H. Ward.

GREAT NORTHERN RAILWAY.
Up Yorkshire-Leeds express. 4-4-2 superheater engine No. 1457.

60 m.p.h., sometimes less, and barely reaching 70 m.p.h. in any single case. Indeed, at the last-mentioned rate I should be beginning to get nervous, as this winding incline is anything but suited to high speeds. What my correspondent's mode of timing could have been I have never fathomed, but some light is thrown on his methods by a postscript to the letter. "I was on Longwood station platform about an hour before finishing off this letter, when the 6 p.m. *ex*-Lime Street for Newcastle came through. The load was 230 tons at the lowest estimate, and I judged the speed to be 93 m.p.h. The engine was a 'Precursor,' and as I heard the 'tick-tick' of the coupling-rods it flashed through my brain that it was exactly identical in rapidity to that of an 'Experiment' I accurately timed at 83 m.p.h." I referred to some readers' methods of rail-joint timing recently as "approximate," but I fear they could not hold a candle in this respect to that based on the "tick-tick of the coupling-rods."

Joking apart, however, one wonders

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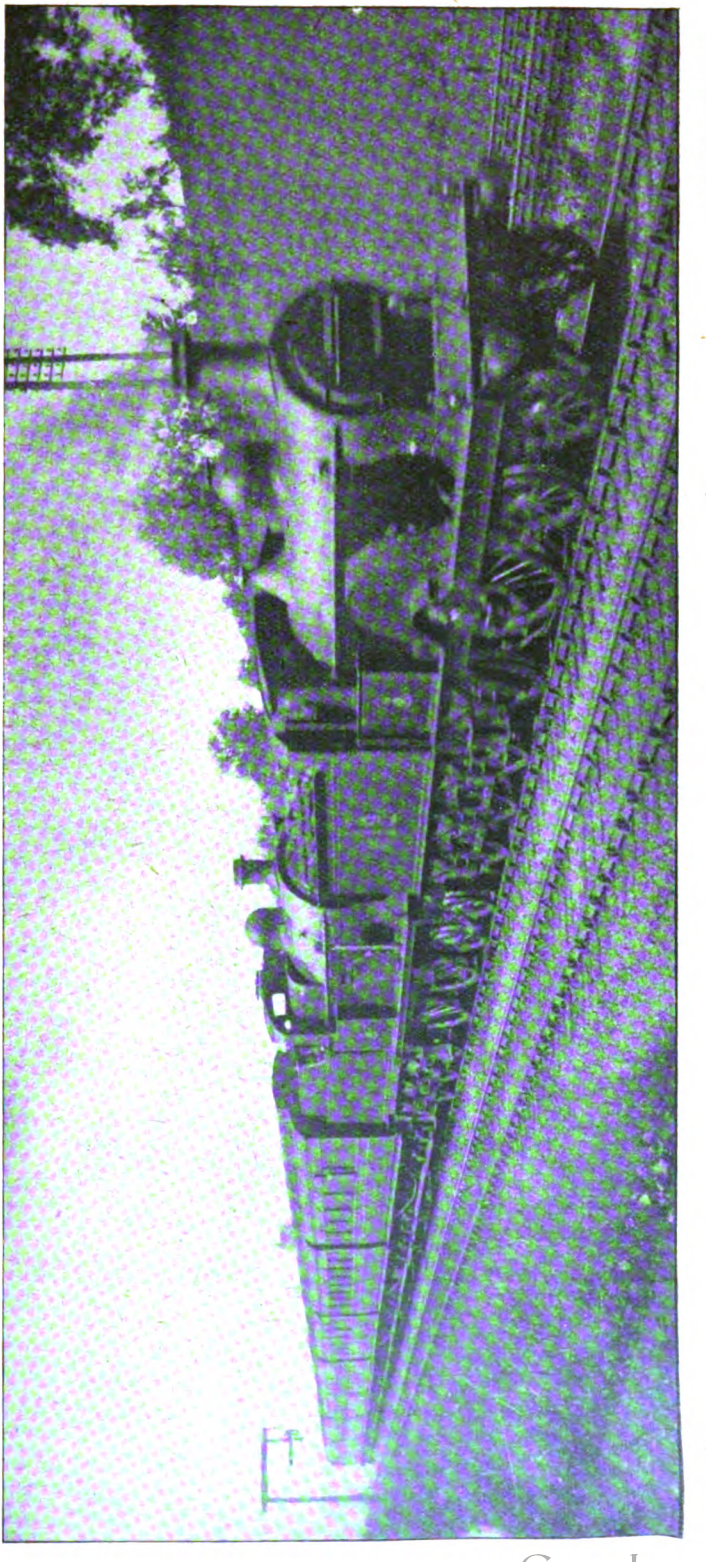
how it is possible for anyone in the least degree conversant with locomotive performance to delude himself with such utterly fantastic ideas as are embodied in the above letter. It only adds further emphasis to my suggestion that the beginner should confine himself to station passing times at first, afterwards proceeding to investigate the more precise points of maximum and minimum speed. As regards the latter, I am afraid that I always look with a certain amount of suspicion on records of speed over very short distances taken with an ordinary watch. An error of one-fifth of a second in a quarter-mile, at very high speeds, means a difference of from 1½ to 2 miles in the speed per hour. Half a second wrong may make an error of 3½ or 4 miles, while a full second increases the error to 7 or 8 miles per hour. And while no error need be made by anyone using a chronograph with reasonable care, as the eye can be kept fixed on the mile-posts, with an ordinary watch the travelling of the eye from post to watch quite



[*Harold R. H. Ward.*

MIDLAND RAILWAY.
Up Liverpool and Manchester express. 4-2-2 engine No. 612 and 4-4-0 engine No. 701.

*Photo.*]

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precludes anything in the nature of real accuracy. In this respect I agree with my first correspondent that it might have been better not to introduce the further that I did so in answer to a direct query on the subject.

Impossibilities in the matter of maxima and minima, however, are not the only

GREAT NORTHERN RAILWAY—LONDON-DONCASTER.

| Distance (miles). | Train | 1.30 p.m. | | | | 5.30 p.m. | Distance (miles). |
|---|---|---|---|---|---|---|---|
| | Run No. | 1 | 2 | 3 | 4 | 5 | |
| | Engine (first stage) No. | †950 | †986 | †988 | *1457 | *1436 | |
| | Engine (second do.) No. | | | *1453 | *1455 | | |
| | Load (axles) | 46 | 50 | 50 | 54 | 56 | |
| | Load (tons) | 350 | 375 | 375 | 405 | 435 | |
| | | M. S. | M. S. | M. S. | M. S. | M. S. | |
| 0.0 | King's Cross dep. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 |
| 2.5 | Finsbury Park pass | 7.30 | 7.35 | 8.35 | 8.15 | 7.35 | 2.5 |
| 12.7 | Potters Bar ,, | 21.00 | 23.05 | 23.40 | 22.00 | 22.55 | 12.7 |
| 17.7 | Hatfield ,, | 26.10 | 28.40 | 29.10 | 27.20 | 28.35 | 17.7 |
| 25.0 | Knebworth ,, | 33.20 | 35.55 | 37.00 | 34.45 | 35.55 | 25.0 |
| 31.9 | Hitchin ,, | 39.35 | 42.10 | 43.40 | 41.10 | 42.15 | 31.9 |
| | | | | | *f* | | |
| 37.0 | Arlesey ,, | 43.35 | 46.00 | 47.50 | 45.30 | 46.15 | 37.0 |
| | | *a* | | | | | |
| 44.1 | Sandy ,, | 50.05 | 51.35 | 54.25 | 53.15 | 52.00 | 44.1 |
| | | | *e* | | | | |
| 51.7 | St. Neots ,, | 58.40 | 59.30 | 61.55 | 60.25 | 58.55 | 51.7 |
| 58.9 | Huntingdon ,, | 65.20 | 66.00 | 68.50 | 67.05 | 65.40 | 58.9 |
| 63.5 | Abbot's Ripton ,, | 70.30 | 71.00 | 74.30 | 72.30 | 71.10 | 63.5 |
| 69.4 | Holme ,, | 75.30 | 76.05 | 79.50 | 77.45 | 76.25 | 69.4 |
| 76.4 | Peterborough arr. | 82.40 | 83.30 | 87.50 | 85.10 | pass | — |
| 0.0 | dep. | 0.00 | 0.00 | 0.00 | 0.00 | ‡83.40 | 76.4 |
| 5.5 | Helpston pass | 9.05 | 9.20 | 9.00 | 8.55 | 91.35 | 81.9 |
| 12.2 | Essendine ,, | 15.50 | 17.00 | 16.00 | 16.25 | 98.50 | 88.6 |
| 15.8 | Little Bytham ,, | 19.30 | 21.20 | 19.55 | 20.30 | 103.00 | 92.2 |
| 20.7 | Corby ,, | 25.35 | 28.10 | 25.50 | 27.10 | 110.00 | 97.1 |
| 23.7 | Stoke ,, | 29.35 | 32.40 | 29.40 | 31.25 | 114.55 | 100.1 |
| | | *b* | | *g* | | | |
| 29.1 | Grantham arr. | pass | pass | pass | pass | 121.30 | 105.5 |
| | dep. | 46.40 | 38.25 | 35.40 | 36.45 | 0.00 | 0.0 |
| | | *c* | | | | | |
| 33.3 | Barkstone pass | 52.50 | 42.35 | 40.25 | 40.55 | 7.10 | 4.2 |
| 39.0 | Claypole ,, | 58.50 | 47.35 | 45.15 | 46.00 | 12.05 | 9.9 |
| | | *d* | | | | | |
| 43.7 | Newark ,, | 65.35 | 51.55 | 49.10 | 50.25 | 15.55 | 14.6 |
| 50.0 | Carlton ,, | 72.45 | 57.55 | 54.45 | 56.45 | 21.25 | 20.9 |
| 55.5 | Tuxford ,, | 78.50 | 64.20 | 60.10 | 64.15 | 27.15 | 26.4 |
| 57.2 | Markham ,, | 81.00 | 66.55 | 62.10 | 67.00 | 29.35 | 27.1 |
| 62.2 | Retford ,, | 86.05 | 72.30 | 66.45 | 72.20 | 34.45 | 33.1 |
| 67.5 | Ranskill ,, | 91.10 | 77.45 | 71.45 | 77.45 | 39.55 | 38.4 |
| 72.9 | Piper's Wood ,, | 96.25 | 83.10 | 77.10 | 83.35 | 45.25 | 43.8 |
| 79.6 | Doncaster arr. | 103.15 | 90.35 | 84.20 | 90.50 | 53.20 | 50.5 |
| 76.4 | Net times First Stage | 80¼ | 82¾ | 87¾ | 82¾ | 121¼ | 105.5 |
| 79.6 | (min.) Second Stage | 85¼ | 90¼ | 83 | 90¾ | 53¼ | 50.5 |

*a*—Severe permanent way check, Sandy. *b*—Single line working, Ponton-Grantham. *c*—Permanent way check, Barkstone. *d*—Very severe signal check, approaching Newark. *e*—Permanent way check, Sandy. *f*—Severe permanent way check, Arlesey. *g*—Permanent way check, Grantham. †—Small-boilered 4-4-2 superheater. *—Large-boilered 4-4-2 superheater. ‡—Pass slowly.

complication of rail-joint timing, as the latter certainly requires a fairly expert acquaintance with the road, in order to be used with reliance, but I may recall the fact features that distinguish certain of my correspondents' records. One scribe specialised consistently in the most amazingly rapid starts, such as Crewe to Minshull

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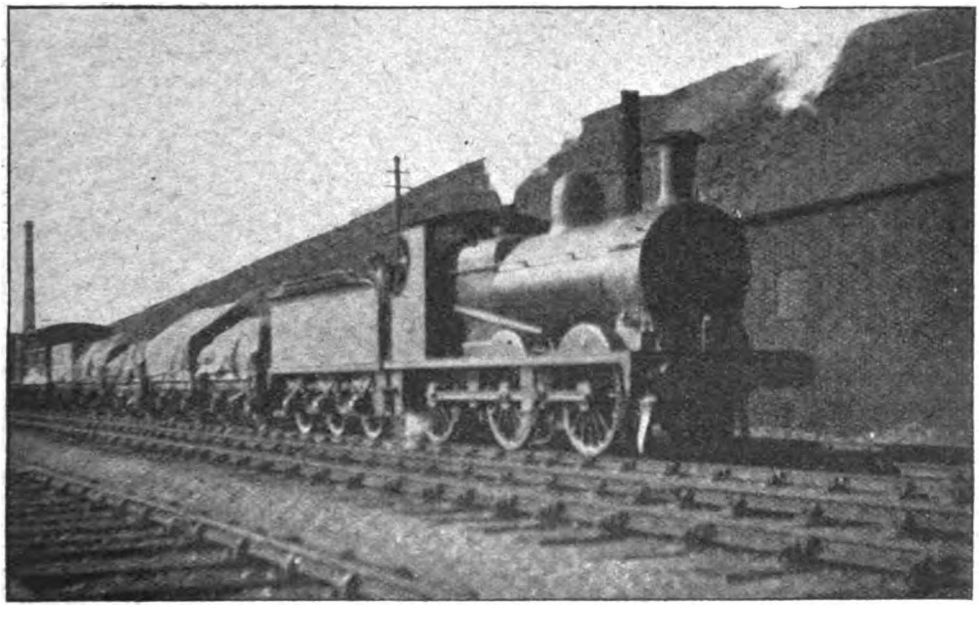
Vernon, all but 5 miles, in 6 min. with 400 tons odd behind the tender, together with a whole series from Waterloo to Clapham Junction in about 6 min.—one, indeed, as brisk as 5¾ min. Consequently, I was quite unable to swallow a couple of further subsequent records from the same source, one announcing a non-stop run from Euston to Crewe—*viâ* Northampton, on account of a blockage on the main line—160½ miles in 163 min. 31 sec., even though the engine were a "Claughton," and the load 370 tons. This run, by the way, had another of those amazing starts—out to Willesden in 8 min. 5 sec. Five days later the same writer represented himself as being taken from Crewe to Preston, 51 miles, in the modest time of 48 min. 2 sec., and from there to Lancaster, 21 miles, in 20 min. 32 sec.—in each case start-to-stop, and on so placid a train as the 10.10 a.m. *ex*-Euston! The most charitable view one can take of such extravagant claims is that the recorder's watch must have been losing very heavily.

As the first correspondent quoted in this article remarks, there is a great deal of "weeding out" of these records to be done. In the ordinary course, however, if those who send logs on to me would take the preliminary trouble of comparing them with other runs over the same route that have been published from time to time, and thus not only exercise as much care as possible in making the record, but also in verifying it, my task would be simplified. Further, a study of published records would show the important "strategic" points to time, so that energy is not expended in securing data that are of no special value, while at the same time important timing points are missed.

One final reference to rail-joint timing. An Irish reader who tried the method "with successful results" on the London and North Western Railway was somewhat mystified with the effects obtained on the Great Southern and Western Railway of Ireland. On alighting he found that the rail-joints, instead of being opposite each other, as normally, were zigzagged, each joint being opposite the centre of the opposite rail. I forgot to mention this when giving the lengths of rail used on different railways; the result is, in effect, to give a 22½ ft. rail so far as rail-joint timing is concerned. My correspondent asks why this practice is in force on the Great Southern and Western Railway, and whether it gives "smoother running." Opinions are divided as to the merits and demerits of



*Photo*] [*Harold R. H. Ward.*

CAMBRIAN RAILWAYS.
Goods engine No. 99 at Aberdovey.

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"staggered" joints. They are supposed to reduce the oscillation of the vehicles, but on the other hand many engineers hold that the constant transference of the oscillation from one side of the vehicle to the other tends to set up a "lurching" motion that might become dangerous at high speeds. The Great Southern and Western Company has, however, used "staggered joints" for many years, and has found them give very satisfactory results; but no other British company has adopted the practice.

Before proceeding to performance, I want to make a remark or two about newspaper trains. I have been quite surprised recently, in conning over the pages of working timetables, to notice the number of really noteworthy expresses that are now being run every morning for the conveyance of newspapers. With some of them, that convey passengers also, readers will be familiar. Most famous, of course, is the Great Central 2.40 a.m. *ex*-Marylebone, with its lightning series of runs—Marylebone-Brackley, 59¼ miles, in 64 min.; Brackley-Rugby, 24 miles, in 24 min.; Rugby-Leicester, 19⅞ miles, in 20 min.; and Leicester-Arkwright Street, Nottingham, 22½ miles in 22 min., start-to-stop in each case. These times, of course, are considerably faster than any others in force on the Great Central Railway. The competing Midland train, leaving St. Pancras also at 2.40 a.m., runs in the fastest standard times, reaching Leicester, 99 miles, in 106 min., and covering the 26½ miles on to Nottingham in exactly half-an-hour, where it arrives 3 min. after the Great Central "flier" has reached Arkwright Street. The Manchester portion of the Midland train covers the 29½ miles from Leicester to Derby in 34 min., and the 62 miles thence over Peak Forest Summit into Manchester in 81 min. On the Great Northern Railway the old 3.15 a.m. down used to be distinguished with a non-stop run to Doncaster, 156 miles, in 169 min.—the "crack" Leeds time—but now leaves at 3 a.m., and calls at Grantham and Retford. Its present timing to Grantham—105½ miles in 116 min.—is substantially the fastest in operation, while the succeeding stages of 33¼ miles to Retford, booked 38 min., and 21 min. for the 17½ miles thence to Doncaster, also involve good work.

Several of these newspaper expresses, however, do not carry passengers and, therefore, do not figure in the public time-books. The Great Western Company has an excellent train leaving Paddington at 2.50 a.m., and first covering the 77¼ miles to Swindon in 80 min.—average 58 m.p.h. After 4 min. stoppage the succeeding 40½ miles to Bristol, *viâ* Badminton, are run in 46 min., making a total of 2 hours 10 min. from London to Bristol, as in the case of the 1.5 p.m. down. Subsequently the fastest standard booking of 83 min. is in force for the 75½ miles from Bristol to Exeter, which is reached at 6.29 a.m., the 20¼ miles on to Newton Abbot taking 25 min., and the last 32¾ mountainous miles to Plymouth 50 min. The corresponding London and North Western train leaves Euston at 3 a.m., making a first call at Rugby, 82¾ miles, in 90 min., and slipping a van *en route* at Blisworth for Northampton. From Rugby to Stafford, 50¾ miles, 56 min. are allowed, and from Stafford to Crewe, 24½ miles, 30 min. A more remarkable London and North Western newspaper express, however, is that leaving Crewe on Saturday nights at 11.10 p.m., the 158 miles to London being run non-stop in the remarkable time of 170 min., which is faster than any regular up timing that has ever existed.

The list would not be complete without mention of the trains now being run daily on the Great Eastern system. The Cambridge line "newspaper," leaving at 5 a.m., is of no particular note, as it calls at all stations from Broxbourne onwards. Neither has the week-day Colchester line train, at 3 a.m. *ex*-Liverpool Street, anything unusual in its timing, which conforms to present-day Great Eastern standards. It is, however, to the special Sunday morning express to Yarmouth *viâ* Norwich, starting at the same early hour, that I want to call attention, as this has indeed "some" schedule. The train consists of six vehicles, mostly 6-wheelers, as far as Colchester, five to Ipswich, and four onwards to Norwich and Yarmouth. From the load standpoint, therefore, it is fairly easy to work, although the booking is considerably faster than any previously in force on the Great Eastern Railway, save possibly the times of the Southend service. Chelmsford, 29·7 miles, is reached in 38 min., a time over a heavily graded section equal to the passing time of the Hook of Holland boat express. The next 8·9 miles to Witham, with a smartly rising start, are scheduled 11 min., and the 13·1 miles on to Colchester 16 min. Two of the most astonishing bookings are those immediately beyond Colchester, the 7·8 steeply undulating miles to Manningtree being only allowed 10 min., and the 9·2 miles thence to Ipswich 11 min. All these, of course, are start-to-stop times, and the last-

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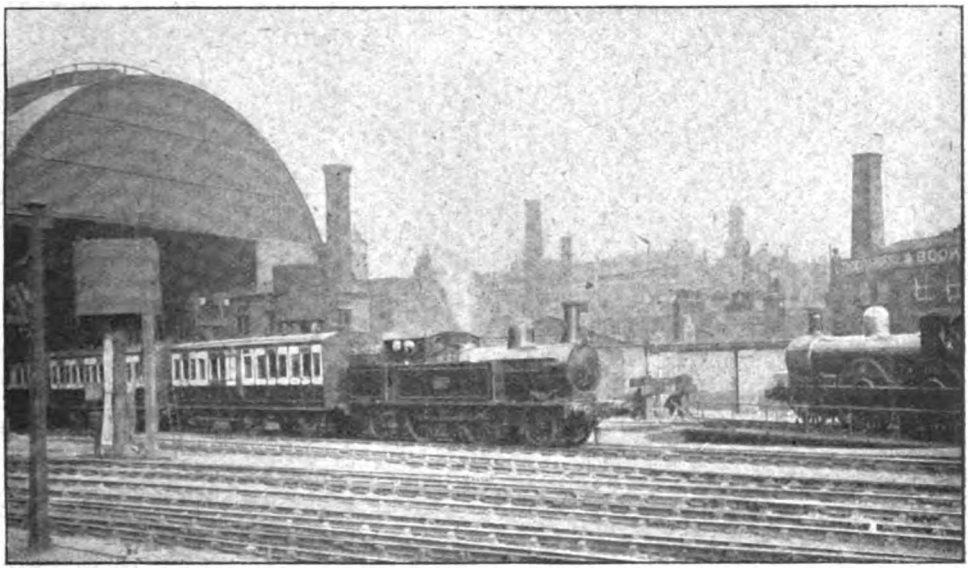
mentioned is really amazing, involving as it does an average of 50 m.p.h. over so short a distance with an initial rise of 3 miles—2 at 1 in 145–157 broken by a level mile past Bentley. Ipswich, therefore, is reached in 97 min., including four stops, or 87 min. actual running time, equivalent to a net time of something like 77 or 78 min. After Ipswich the 11·9 very gradually rising miles to Stowmarket are run in 14 min., the 14·4 miles on to Diss (commencing with Haughley bank) in 18 min., and the 19·1 miles from Diss to Norwich, concluding with the prolonged slack through Trowse, in 29 min. The last-mentioned is, of course, a very easy time, as compared with those preceding it.

expresses has been entrusted to a limited circle of the best drivers, working almost entirely superheater engines (a good number of the standard "Atlantics" has now been superheater-equipped) and the results are apparent in the improved time-keeping, despite the increasingly onerous character of the demands made on the engines. The four runs with which I am principally concerned were made on the amalgamated 1.30 and 1.40 p.m. expresses from King's Cross to Doncaster, while they are also accompanied by a journey on the 5.30–5.45–6.5 combination as far as Doncaster. A feature of the trips is the extensive use made of the smaller "Atlantics," and the comparative uniformity



*Photo*] [*W. H. Whitworth.*

LONDON AND NORTH WESTERN RAILWAY.
2-4-2 tank engine on train at Exchange station, Manchester.

Were the start not so uncomfortably early, I should greatly like to sample this modern example of Great Eastern enterprise, but fear I shall have to be content for the present with the time-table version of its prowess.

In turning now to performance, although a good deal of space has been devoted in these columns during recent months to Great Northern locomotive work, I am anxious to describe some runs on the modified expresses of that system, before the particulars in any degree become "stale" by reason of further alterations. Since the modification of the times and the amalgamation of various trains, it would appear from casual observation that the operation of the principal

of their work with that of their larger brethren. The times of these runs will be found in the annexed table, but a few added comments are necessary on their leading features. Full details of the Great Northern main line gradients were given in the RAILWAY MAGAZINE of last June.

On No. 1 run Chatwin, driving the small superheater "Atlantic" No. 950, had a fairly manageable load of ten 8-wheelers (partly corridor and partly large non-corridor stock) together with a Gresley "twin," total 46 axles. A very fine start was made, the time to Finsbury Park being excellent, and a maximum speed of 53 m.p.h. at Wood Green was succeeded by a sustained

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minimum of 42·9 at Potters Bar. At Hatfield we touched 72·5 m.p.h., and then went over Woolmer Green crest with no lower rate than 55. Beyond Hitchin we maintained 77·5 m.p.h., and were still running at 70·3 beyond Biggleswade when our flying progress was rudely arrested by a bad permanent way check through Sandy, costing a full 2¼ min. From the effects of this we did not recover much before St. Neot's, but touched 67 m.p.h. at Offord, and then went up Stukeley bank at a lowest rate of 48·4 m.p.h. Sustaining 75 m.p.h. down Ripton bank, we finished finely into Peterborough, the time from Ripton being quite the smartest of the series, and enabling us to arrive 20 sec. early. The net time for this stretch was 80½ min.

Restarting from Peterborough, with the usual banking assistance in rear out of the platform, Chatwin once again set to work in great style, touching 59·2 m.p.h. at Helpston and maintaining 58·4 as far as Essendine. At Bytham the speed had only fallen to 52·9 m.p.h., and at Stoke the minimum was 42·9 m.p.h., the time of 29 min. 35 sec. from Peterborough (start) up to Stoke constituting a first-class achievement. After this troubles came thick and fast. A truck off the road at Saltersford occasioned single line working from Great Ponton to Grantham, entailing a dead slack through the latter place, with a preliminary stop at High Dyke, and a stop and set back at Ponton. Then came a bad relaying check at Barkstone, and, finally, after we had touched 70·3 m.p.h. at Claypole, we were almost brought to a dead stand by a troop special shunting at Newark. Disheartening though these delays were, Chatwin was now on his mettle, and put up some remarkable running onwards to Doncaster. We touched 60 m.p.h. before commencing to ascend Tuxford bank, and only fell to 46·4 on the ascent of the latter, touching 67 an hour before Retford. Here we eased, but accelerated again to 67 m.p.h. at Ranskill, sprinted over Piper's Wood "hump" with a minimum of 52·5, and then reached 69 m.p.h. on the descent past Rossington. With this running, even on such a crack booking as that of the 1.30 p.m. down, a total of 5½ min. net had been economised by the engine, which, with the net time to Peterborough, equalled a non-stop time of 165 min. from London to Doncaster. This, it will be remembered, was the schedule of the old 2.15 p.m. *ex*-King's Cross, with its featherweight load of four vehicles.

Next in the table—No. 2 run—is a journey with a load heavier by one 8-wheeler, and again with a superheater small "Atlantic." The running was not so good as that of No. 950 at the start, speed falling to 37·5 m.p.h. on Potters Bar bank, and not rising above 71·4 at Hatfield. At Hitchin, therefore, the times were over 2½ min. in arrears of those of run No. 1. Beyond Hitchin, however, some fine running was made, speed being maintained for a considerable distance at 80·3 m.p.h., and at one point touching 81·8. On the slight ascent beyond Arlesey we only fell to 73·8 m.p.h., and Biggleswade was passed at 77·5. Thus the times from Knebworth to Sandy were the fastest of the series, 19·1 miles in 15 min. 40 sec. indicating an average speed of over 73 m.p.h. The permanent way check beyond Sandy was not a severe one, and we touched 61·6 m.p.h. at Tempsford, falling only to 60 at St. Neot's, and accelerating to 69·2 at Offord. Up Stukeley bank we maintained 51 m.p.h.—excellent going this—and touched 75·8 on Abbot's Ripton bank, but the finish of the run was slower than that of run No. 1. Still, with the leisurely going to Hatfield, and the subsequent delay at Sandy, we were only ½ min. late, having made the run in a net time of 82¾ min.

Again in starting from Peterborough the times of No. 986 fell substantially behind those of No. 950, the engine slipping rather badly at first. The time to Stoke was the longest of any, speed falling to 36·3 m.p.h. at the summit, and the minutes thus dropped were more than the engine was able to regain. A very cautious descent was made to Grantham, barely exceeding the mile-a-minute rate, and beyond Peascliffe Tunnel the speed was not particularly high, rising as it did to maxima of 71·4 m.p.h. before and 69·2 m.p.h. after Claypole. Up to Markham we did rather poorly, speed falling to 39·5 m.p.h., and again very cautious running ensued down to Retford. The best No. 986 could do beyond Ranskill was 64·3 m.p.h., and with a minimum of 49·4 over Piper's Wood summit, we finished into Doncaster in 2 min. 35 sec. over the time scheduled.

No. 3 run started quite feebly to Peterborough, this being the only pronounced case of loss of time, despite the fact that there were no delays of any sort. It must be conceded, however, that heavy rain and a gusty west wind did not assist the running. So we fell to 36 m.p.h. at Potters Bar, 50 at Woolmer Green, and 45 on Stukeley bank, with accompanying maxima of only 70·3

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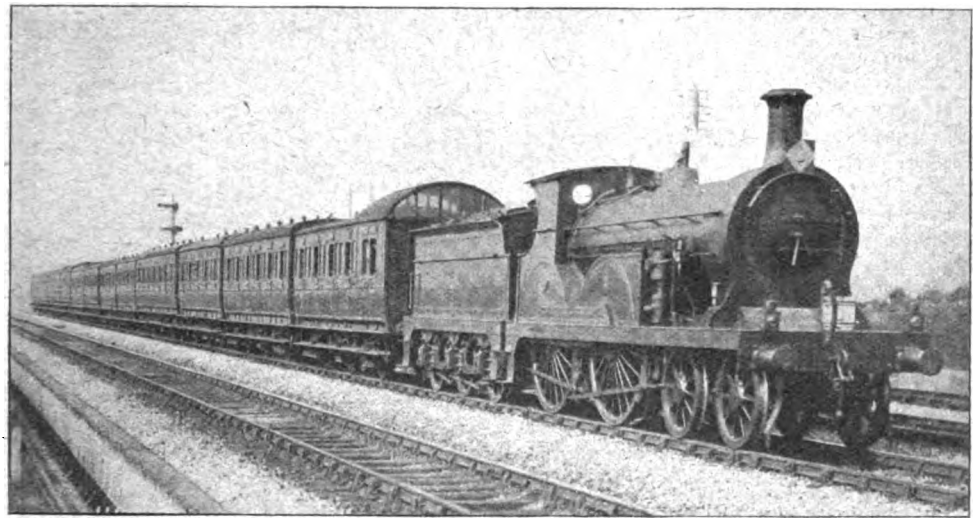
m.p.h. at Hatfield and 75 at Three Counties, and reached Peterborough nearly 5 min. late. This, however, furnished Buxton, driving the large superheater 4–4–2 No. 1453, with the opportunity of displaying some of the most superlative work in the whole table. Work over the initial stretch to Stoke corresponded fairly closely in times with that of No. 950, although the load in this case was slightly heavier; the minimum speed at Stoke Summit was 44·5 m.p.h. After running carefully down to Grantham, and being pulled up for a permanent way caution through the station, Buxton then set out in earnest to regain lost time. At Hougham the speed was 70·3 m.p.h., beyond Claypole it was 75, at Newark again 70·3, while the rate onerous conditions of loading the driver deserves every commendation.

On the last of these four runs the load was augmented by still another corridor coach, and, while on the preceding trips the train had been very full, on this occasion it was simply packed. Weather conditions were bad, a brisk north-east wind and a continuous drizzle hampering the running considerably. This occasioned slipping at the start, but a very fair time was made from Finsbury Park to Potters Bar, the speed having fallen to 45 m.p.h. at Hadley Wood, and dropping finally to 43·7 at Potters Bar Summit. At Hatfield we touched 70·3 m.p.h., and then, after an intervening minimum of 50·5 at Woolmer Green, 77·5 beyond Hitchin,



*Photo]* [*F. E. Mackay.*

SOUTH EASTERN AND CHATHAM RAILWAY.

Tunbridge Wells and Hastings express. Stirling 4-4-0 engine No. 456.

was maintained so magnificently across the level Trent Valley that we were still doing 69·2 m.p.h. at Carlton and 67 at Crow Park. Unrivalled climbing to Markham followed, no speed lower than 53·5 m.p.h. being reached, despite 6 ascending miles (3¼ at 1 in 200) and a load of 375 tons. Descending to Retford we touched 70 an hour and then shut off steam until past the station, afterwards running at a sustained 64·3 from Sutton to Scrooby, and going over Piper's Wood at 52·9 m.p.h. The result of this magnificent work was a gain of 3 min. 40 sec. on one of the fastest schedules on the Great Northern system, despite the Grantham delay, or a net gain of 5 min., and under such but the latter sprint was cut short by a long and severe permanent way check past Arlesey. From this we recovered gradually, passing Sandy at 63·8 m.p.h. and Tempsford at 66·1, while the lowest rate at St. Neot's was 59·2 m.p.h. Touching 67 m.p.h. at Offord, we went up Stukeley bank with a minimum of 46·9, but only attained 69·2 in the descent of Ripton bank, the last stage of the run from Huntingdon to Peterborough, indeed, being slightly inferior in quality to the work preceding it. So Peterborough was reached over 2 min. late, although the net time was only 82¾ min., and the work with such a load was undeniably fine.

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At Peterborough we exchanged No. 1457 for No. 1455, and the work of the latter was very similar in character to that of No. 1457—very fair in its early stages, but inclined to be sluggish in conclusion. We did not exceed 54·5 m.p.h. at Helpston, had fallen to 47·4 at Little Bytham, and dropped finally to 39·1 at Stoke. Touching 67 m.p.h. beyond Great Ponton, we eased through Grantham, and then were unable to do anything better than 70·3 at Claypole. The climbing to Markham was poor, the lowest rate being 39·1 m.p.h.—against the 53·5 m.p.h. of No. 1453!—and further rather leisurely running contrived to lose nearly 3 min. on our booked time from Peterborough to Doncaster. Even under such conditions, however, it is worth noting that the net time of both stages of the journey only totals 173½ min.—a time that compares favourably with the present London and North Western standard allowance of 3 hours to Crewe, only 2 miles further, and over a much more easily-graded route.

We now come to No. 5 run, which shares the honours of the table with the second part of No. 3, and is one of the finest continuous journeys behind one engine that I have ever timed on the Great Northern Railway. The load was one of fourteen 8-wheelers, every one of the latest corridor stock, either Great Northern or North Eastern, save for the three modern non-corridor bogies in the Leeds portion. No. 1436 was the engine—a superheater "Atlantic" superbly handled by Bentley and the running was exceedingly fine on almost every stage. Quite a remarkable start was made to Finsbury Park, load duly considered, and a good speed was maintained beyond to Potters Bar, the lowest rate being 36 m.p.h., save for a momentary fall to 34·6 at the summit through premature notching up. At Hatfield we touched 70·3 m.p.h., and at Woolmer Green fell to 52·9, but beyond Hitchin we sustained 80·3 m.p.h., falling only to 72·5 beyond Arlesey, rising to 75 at Biggleswade, and then tailing off gradually to 70·3 at Tempsford and 58·4 at St. Neot's. Round the river bank at Offord we were doing 66·1 m.p.h., and then fell to 45·9 on Stukeley bank, afterwards touching 72·5 on the descent to Holme. Beyond Yaxley the speed dropped to 58·4 m.p.h., but we were doing exactly 60 an hour when steam was shut off for Peterborough. The Cathedral City was passed slowly in 83 min. 40 sec.—equivalent to a stop in about 84 min., and a fine effort with such a load. At Helpston we touched 56·3 m.p.h., and then maintained speed well up the long ascent to Stoke, only falling to 51·7 m.p.h. at Essendine and 47·4 at Bytham. Beyond Corby, however, the driver, knowing he had time in hand, allowed the speed to fall rather rapidly, and fractionally miscalculated, as the summit rate was only 32·2 m.p.h., and we were thereby ½ min. behind time at Grantham.

But Bentley made ample amends on the second stage. A brilliant start was effected from Grantham, Barkston being passed in 7 min. 10 sec. and Hougham in 8 min. 50 sec. (beating, and in most cases handsomely, all the starting times on the 4.26 p.m. from Grantham given in the June issue), and beyond Claypole we sustained for some distance a top speed of 76·3 m.p.h. Newark was passed at 73·8 m.p.h., and at Carlton we were still doing 66. The time of 14¼ min. for the 16·7 miles from Barkston to Carlton was the fastest in the table, and indicates an average rate of 70·3 m.p.h. Continuing, we topped Markham Summit with a minimum rate of 43·7 m.p.h., but did not exceed 68·1 down to Retford, later eased to exactly 60. At Ranskill we were again running at 65·2 m.p.h., and then went over Piper's Wood crest at 47·9. As we were now well in front of time Bentley very markedly eased his engine, but even then we ran into Doncaster, passing very carefully to the Western platform, in 53 min. 20 sec. from Grantham. With such a finish as that of No. 1 run we could have stopped easily in 52¼ min. from Grantham. Equally the first run to Grantham, without the very pronounced easing from Corby onwards, might have been completed in the even 2 hours from London. With the last-mentioned allowances I reckon that these times are equivalent to a non-stop run of 168½ minutes' duration between London and Doncaster—a truly phenomenal feat, of which Bentley might well be proud, when the difficulties of the Great Northern road, coupled with such a load as 435 tons, are duly taken into consideration. A further run on the 1.30 p.m. down, timed since I penned the foregoing notes, on which time was kept with a load of 54 axles, together with several logs of the running of the same train that have reached me from correspondents, must be held over for the present.

Similarly, on account of its "topical" nature, I want to refer to an equally noteworthy run on the 5.20 p.m. express from Liverpool to Euston, which now absorbs at Stafford a generous addition to its load, in the shape of the North Wales express previously due in Euston at 9.5 p.m., and also

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stops at Blisworth in order to give connection to and from Northampton. In August last I described a short run on this train from Blisworth to Willesden, but since then I have had the opportunity of making a more extended journey, from Crewe, together with the good fortune of an exceptional load and an unpiloted train engine. The engine in question was one of the latest of the 4–6–0 "Prince of Wales" type—No. 505 *Onyx*. Out of Crewe the load was light, totalling only eight 8-wheelers, 227 tons tare and rather under 240 tons full. On an easy booking to Stafford, also, no particular effort was made, speed falling to 39·1 m.p.h. on Madeley bank, and not rising above 68·1 at Standon Bridge. So the 10½ miles from Crewe to Whitmore took 16 min. 35 sec., and the 24½ miles to Stafford 30½ min. But here matters changed altogether from the load standpoint, the train being made up to fourteen corridor bogies, nearly all the latest stock—406 tons empty and fully 425 gross, with a heavy load of passengers and luggage. We started from Stafford slightly behind time.

Colwich, 6⅜ miles, was passed in 10 min. 25 sec., and Rugeley, 9¼ miles, in 13 min. 20 sec., just beyond which point we touched 63·8 m.p.h. After a brief fall to 57·7 m.p.h. near Armitage, we attained 69·2 m.p.h. at Hademore troughs, shortly afterwards accelerating to 71·4 m.p.h., so that the 14¼ miles from Rugeley to Tamworth were covered in 13 min. 35 sec. Some splendid work followed, speed on the rising grades beyond Polesworth not falling below 54·2 m.p.h., while, after an intervening spurt at 62·5 beyond Atherstone, we went right up to Shilton without anything lower than 54·9 m.p.h. Before Rugby slack we touched 66 m.p.h., having covered the 12⅞ miles from Tamworth to Nuneaton in 12 min. 55 sec., the 5⅞ miles thence to Shilton in 6¼ min., and the 8⅝ miles on to the centre of Rugby station in 8½ min.—a total of 54 min. 35 sec. for the 50⅞ miles from Stafford. On the ascent to Kilsby Tunnel the speed settled down to a steady 47·4 m.p.h., increased to 49·5 in the passage of the tunnel, and shortly afterwards to 70·3 m.p.h. beyond Weedon. Thus the 7⅜ miles from Rugby to Welton occupied 8 min. 55 sec., the 5¾ miles thence to Weedon 5 min. 5 sec., and the 6¾ miles from Weedon to Blisworth stop 6 min. 55 sec. This gave an aggregate of 75½ min. for the 70¾ miles from Stafford to Blisworth, start-to-stop, so that the engine had already 4½ min. to its credit, even on this fast booking.

Getting away again, we negotiated the 3 uphill miles to Roade in 6 min. 10 sec., and then, with a top speed of 69·2 m.p.h. over Castlethorpe troughs, covered the 7⅜ miles from Roade to Wolverton in 7¼ min. On the level or faintly rising stretch that precedes the ascent to Tring, speed was well maintained, the rate at Bletchley being 60 m.p.h., at Leighton 57·7, and at Cheddington 52·9, while we went right up Tring bank at a steady 50, topping the summit at exactly this figure. Our time from Wolverton to Bletchley, 5¾ miles, was 5 min. 35 sec.; from Bletchley to Leighton, 6½ miles, 6 min. 35 sec., and from Leighton up to Tring, 8½ miles, 9 min. 20 sec., making a total of 34 min. 55 sec. for the 31⅝ miles from Blisworth. Time was now well in hand, so no undue haste was shown on the descent to Willesden. The highest speeds reached were 69·2 m.p.h. at King's Langley and 71·4 at Sudbury, the 14⅛ miles from Tring to Watford taking 13 min. 25 sec., the 9½ miles from Watford to Sudbury 8½ min., and the last 2½ miles to Willesden 3 min. 35 sec., the stop being slowly and carefully made in order to fit the long train exactly to the platform. Thus we had covered the 57¼ miles from Blisworth to Willesden in 60 min. 25 sec., start-to-stop, and by running from Willesden to Euston in exactly the 10 min. allowed, the engine gained altogether 5 sec. over 6 min. between Stafford and Euston. On such form the 133½ miles from Stafford to Euston, if run non-stop, would have been covered in between 138 and 139 min., or substantially faster than any booking previously in force—and this on a "War" schedule, with a load of 425 tons! With such possibilities, as well as those already detailed on the Great Northern Railway, in view, it is hardly possible to regret the institution of War-time train services.

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*Drawn by C. W. Walton*] [103, *Shaftesbury Avenue, W.*

**THE RIGHT HON. LORD FARINGDON.**

CHAIRMAN:

GREAT CENTRAL RAILWAY.

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# Railway Portrait Gallery.

## THE RIGHT HON. LORD FARINGDON.

### Chairman, Great Central Railway.

BORN in London on September 28th, 1850, the Great Central Railway Chairman is of Scottish descent. Upon the death of the Earl of Wharncliffe in 1899, Lord Faringdon—then Mr. Alexander Henderson—succeeded to the position of Chairman of the Great Central Railway Board of Directors, of which body he had been a member since 1894. At the time of Lord Wharncliffe's death the extension to London had only been open a few months, and the new chairman at once devoted his energy to the development of the traffic by the inauguration of adequate services and by making known far and wide among the trading community and the travelling public the facilities and advantages offered by the new route between London, the Midlands and the North. The policy initiated in the early days of the London Extension has been continued to the present, and under the chairman's guidance and with his encouragement the officials of the Great Central Railway have acquired a reputation for keenness and business acumen which qualified observers readily admit is thoroughly deserved. As stated, Lord Faringdon was first a director of the Great Central Railway (then known as the Manchester, Sheffield and Lincolnshire) in 1894, and he assisted greatly in raising the large amount of capital necessary for the London Extension, which with Immingham Dock, opened in 1912, and likewise a Great Central Railway project, comprise the two most prominent and important British railway enterprises of the past quarter of a century.

Lord Faringdon has been intimately connected with railways from his first introduction into business life, for he received his training in commercial affairs in the office of Messrs. Deloitte & Co., the Accountants of the Great Western Railway. It is not strange, therefore, that under Lord Faringdon's administration very close relationships have been brought into being between the Great Western and the Great Central Railways.

In addition to the Great Central Railway, Lord Faringdon is interested in several railways abroad—principally in South America—whilst in Great Britain the coal and iron industries and public works engage a portion of his activities. Since the outbreak of war the Great Central Chairman has devoted a considerable amount of time to national service.

At the Coronation of H.M. King Edward VII. in 1902 the subject of our sketch was created a Baronet, and was known as Sir Alexander Henderson, Bart., from that date until he was honoured with a peerage by H.M. King George V. on New Year's Day, 1916. A member of the Royal Commission on Civil Service Superannuation, 1903, and the Tariff Commission of 1904, his parliamentary career dates from 1898, when he was elected to the House of Commons for the West Division of Staffordshire, being re-elected, unopposed, in 1900. He subsequently sat as the representative of St. George's, Hanover Square.

Lord Faringdon's country seat is Buscot Park, Faringdon, Berks.

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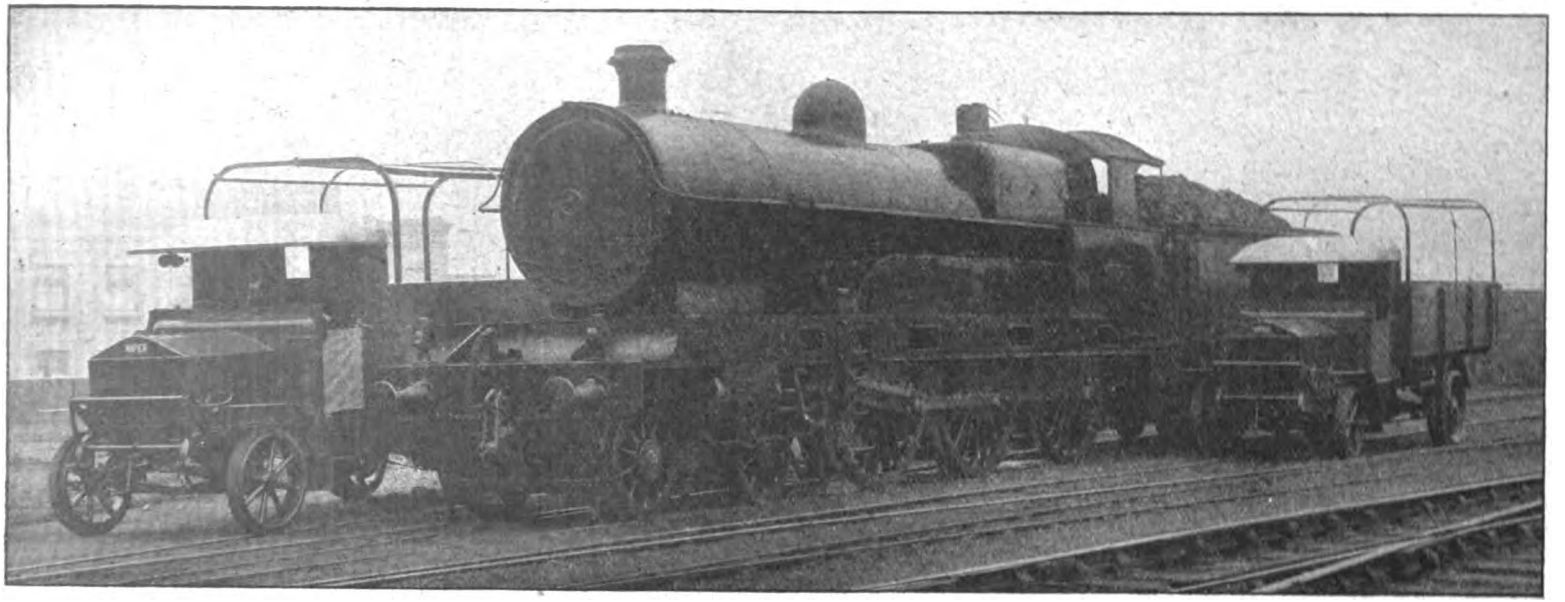
# The Railway Locomotive and the Motor Road Vehicle in Partnership.



Photographs have previously been reproduced showing Napier business vehicles standing alongside Great Central and Great Northern Railway locomotives respectively. A further illustration is now given wherein two 3½-ton Napier business vehicles are portrayed with one of the latest engines of the London and North Western Railway, which bears the name of *Sir Robert Turnbull*, so well known as Superintendent of the Line and General Manager of the London and North Western Railway, though now retired after lengthy and honourable service.

In the old days it was assumed that the motor transport vehicle would be a deadly enemy to the railway companies. Time has, however, shown that on the contrary the motor vehicle is a most valued ally to the railways both in the United Kingdom and abroad, for service in outlying districts, and for collection and delivery work in large towns.

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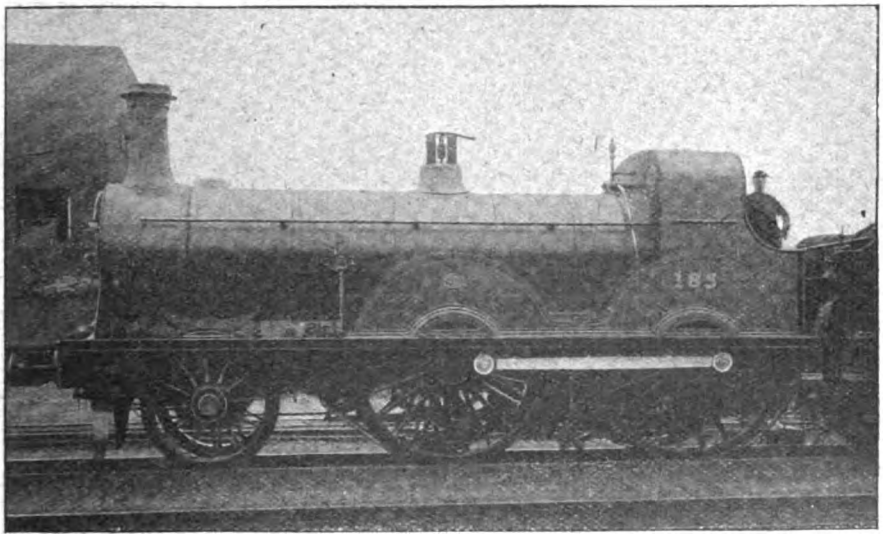
# Locomotive and Train Working in the latter part of the 19th Century.

## THE GLASGOW AND SOUTH WESTERN RAILWAY. [No. II.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

(*Continued from page* 188, *September* RAILWAY MAGAZINE.)

MR. SMELLIE'S first express engines, built in 1879–1880 at Kilmarnock, were known as the No. 18 class, although the engine which bore that number was not the first to be built. In these Mr. Smellie discarded the bogie, and reverted to the old 2–4–0 type. They were as follows :—Nos. 157, 158, 185, 186, 26, 27, 28, 29, 18, 31, 40 and 42, of which the first few came out in 1879. Cylinders were 18 in. by 26 in., and coupled wheels 6 ft. 9½ in. diameter, a size that has remained standard for four-coupled main line express engines on this railway. The leading wheels were 4 ft. 4½ in. diameter. Heating surface, larger than that of the Stirling bogies, was 1,206 sq. ft., of which the firebox supplied 101 sq. ft., and the boiler was pressed at 140 lb. The leading axleboxes had inclined planes to allow freedom for lateral movement ½ in. on each side. The standard Stirling steam reversing gear was adopted, and the total weight of the engines was 38½ tons in working order.




*Photo*] [*G. F. Burtt.*

NO. 185 (137 CLASS) 2–4–0 ENGINE.
Designed by Mr. H. Smellie (1879–80).
Coupled wheels, 6 ft. 9 in. Cylinders, 18 in. by 26 in.

These engines were immediately stationed at Glasgow and Carlisle and replaced some of the Stirling bogies on the Scotch expresses, and they remained on these trains for six or seven years, until Mr. Smellie's later 4–4–0 engines came out in 1886–9. They were undoubtedly very good engines; a Scotch locomotive engineer connected with one of



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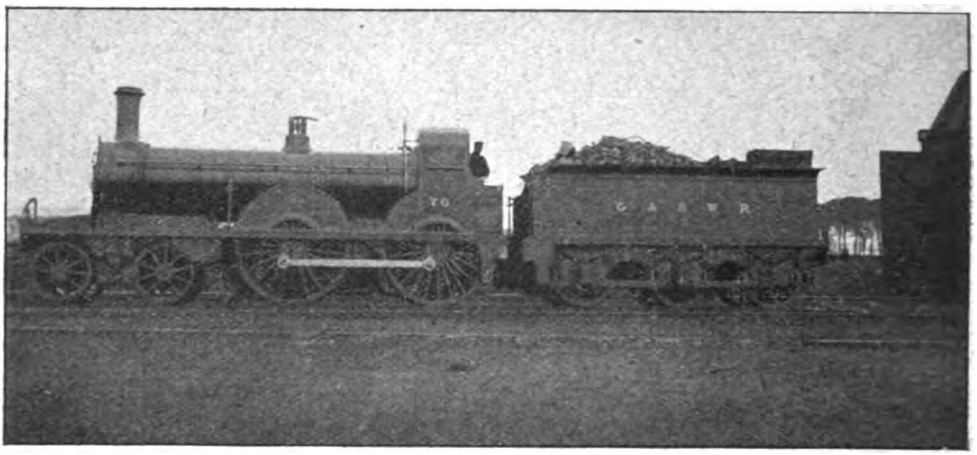


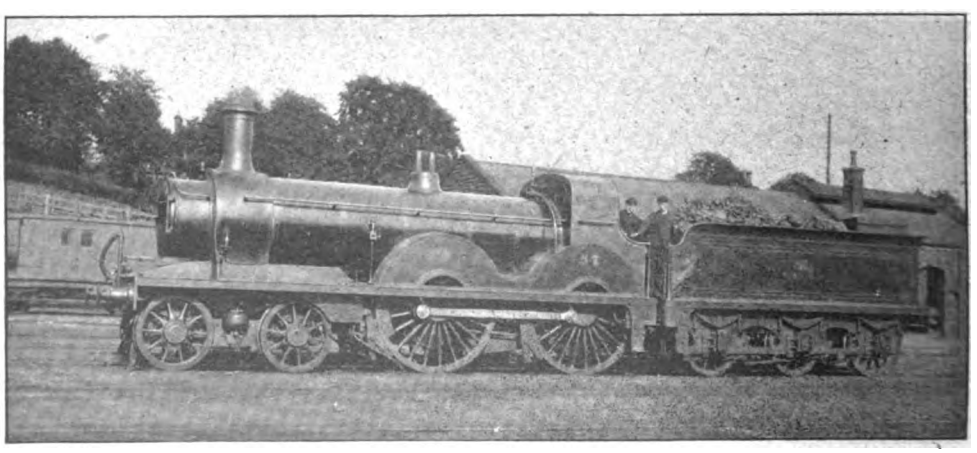
*Photo*] [*A. Robinson.*

NO. 70, DESIGNED BY MR. H. SMELLIE 1886–9, WHICH BEARS THE ROYAL ARMS ON SIDE OF CAB.
Coupled wheels, 6 ft. 9½ in. Cylinders, 18¼ in. by 26 in.

the other main lines in Scotland told me at the time they were working main line trains, that they were then the best express engines north of Carlisle. And as he was not a Glasgow and South Western man, his opinion had at least the merit of being impartial.

Of this class, about eight of the original twelve survive, though as I have not seen them for a long time, I do not know what most of them are now doing. No. 18 was for a long time at Stranraer and in the "'nineties" worked the Stranraer boat train to Carlisle. I hear that this engine is still at Stranraer as pilot engine, and that old 185 is on stationary work at Carlisle, where it was stabled for a long period. During the last years of the 19th century Nos. 26 to 29, 40, 42, 158 and 186 were at Glasgow running trains to Ayr, Girvan and Stranraer; 31 was at Dumfries, usually working on the Stranraer road, whilst 157 was with 185 at Carlisle.

Following these, Mr. Smellie turned his attention to the Coast trains, and designed a new class of 4–4–0 engine for heavy gradients, the 119 class, which I used to hear called the "Greenock bogies." These engines were built at Kilmarnock during the years 1882 to 1885, and were twenty-four in number, *viz.*:—Nos. 119, 120, 123 to 140, 151, 152, 155 and 156. They had cylinders 18¼ in. by 26 in., coupled wheels 6 ft. 1¼ in. and



4–4–0 ENGINE NO. 57, FITTED WITH EXTENDED SMOKEBOX.
Built at Kilmarnock, 1887, by Mr. H. Smellie.
Coupled wheels, 6 ft. 9 in. Cylinders, 18¼ in. by 26 in.

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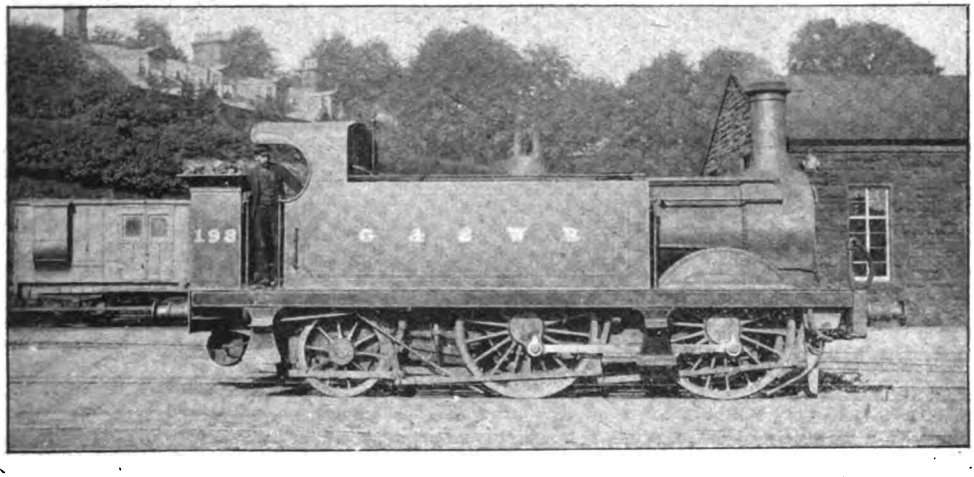
bogie wheels 3 ft. in diameter. The total heating surface, in spite of the increase in the size of the cylinders, was only 1,065 sq. ft., and the engines weighed 41½ tons in working order. These engines have always worked more or less on the Coast trains from Glasgow to Greenock, Largs and Ayr and they were also to be found at Stranraer. They may and probably did make occasional journeys on the Dumfries main line, but I never saw them on it myself.

Following these came more main line engines—this time of the 4–4–0 type again, for since the 18 class of 1880 appeared, no passenger engine has ever been built for the Glasgow and South Western that has not a bogie. There were 20 of these built 1886–1889, in the following order :—Nos. 153, 154, 79, 52 to 57, 65 to 70, 86 to 89 and 109. The cylinders are the same as those of the 119 class, *viz.*, 18¼ in. diameter by 26 in. stroke ; the coupled wheels are 6 ft. 9½ in. and the bogie wheels 3 ft. 7½ in. in diameter. The total heating surface was 1,198 sq. ft., of which the firebox supplied 106 sq. ft. The boiler pressure was raised in these engines to 150 lb., and their weight in working order was 42¼ tons. The tenders were not very large for a main line express engine and carried only 2,500 gallons of water.

One of the class, No. 70, which came out early in 1888, was fitted with one of the earliest extended smokeboxes to be used in this country. This extension, however, did not take the usual shape of the full diameter of the smokebox, but was in the form of a drum of smaller diameter fixed on the front. There were one or two others of the class with similar smokeboxes, of which No. 57 is illustrated. How long No. 70 remained the proud possessor of this wart on its chest I do not remember, but some years later the excrescence had evidently been cauterized. No. 70 was afterwards used for a Royal special, in honour of which it carried for some time the Royal Arms painted on the cab.

The Smellie bogies began to replace the older express engines on the Glasgow–Carlisle road and handled the fastest trains for some years. The following is a sample of a run with the up day Scotch express when these engines were new, and gives a very good idea of the working of those days. It was usual with these heavy trains to take a pilot over the Barrhead route, and this engine assisted as far as New Cumnock, where the train slowed down to walking speed to allow the pilot to be detached. The mileposts beyond Kilmarnock are numbered consecutively with the older Paisley loop.




0–4–2 PASSENGER TANK ENGINE, REBUILT BY MR. SMELLIE FROM 0–4–2 TENDER ENGINE.
Coupled wheels, 5 ft. 7 in. Cylinders, 17 in. by 24 in.

The engines were a Smellie 6 ft. 9 in. coupled bogie of the 153 class, piloted by a 6 ft. 9 in. 2–4–0 of the 18 class. Load about 230 tons.

| | | H. M. S. | SPEED. | |
|---|---|---|---|---|
| St. Enoch | .. dep. | 0. 0. 0 | | |
| Post 4.. | .. pass | 8.18 | | |
| „ 5.. | .. „ | 9.35 | 46·7 | |
| „ 6.. | .. „ | 10.50 | 48 | |
| „ 7.. | .. „ | 12.13 | 43·4 | |
| „ 8.. | .. „ | 13.58 | 34·3 | 1 in 70 up |
| „ 10.. | .. „ | 18.52 | 24·5 | |
| „ 11.. | .. „ | 21. 6 | 26·9 | |

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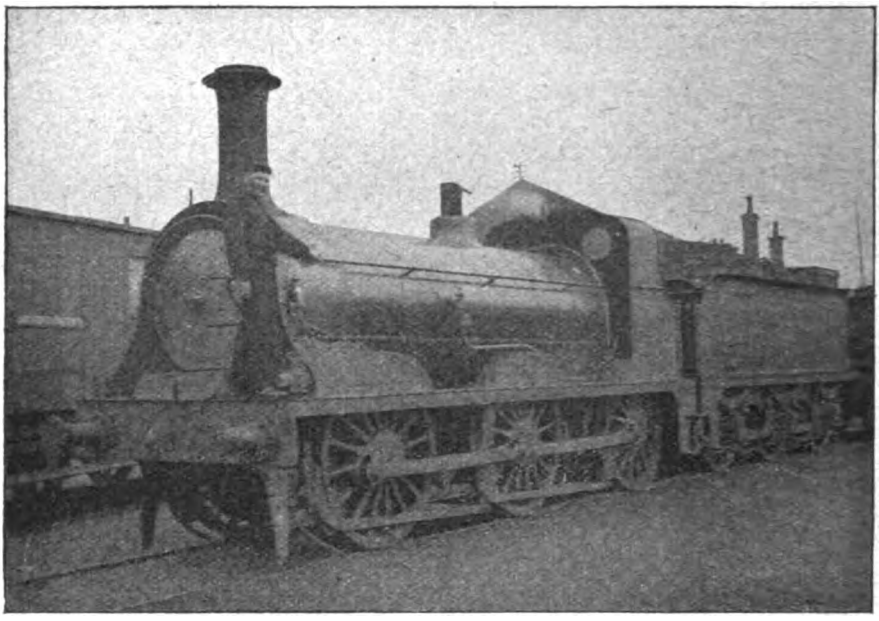

*Photo]* [*Rev. E. J. Robinson.*

GOODS ENGINE NO. 296 (H. SMELLIE).
Coupled wheels, 5 ft. 1 in. Cylinders, 18 in. by 26 in.

| | | | H. M. S. | SPEED. |
|---|---|---|---|---|
| Post 12.. | .. | pass | 22.21 | 48 |
| „ 13.. | .. | „ | 23.33 | 50 |
| „ 14.. | .. | „ | 24.48 | 48 |
| „ 15.. | .. | „ | 26. 5 | 46·7 |
| „ 16.. | .. | „ | 27.18 | 49·3 |
| „ 17.. | .. | „ | 28.31 | 49·3 |
| „ 18.. | .. | „ | 29.40 | 52·2 |
| „ 19.. | .. | „ | 30.41 | 59 |
| „ 20.. | .. | „ | 31.41 | 60 |
| „ 21.. | .. | „ | 32.40 | 61 |
| „ 22.. | .. | „ | 33.36 | 64·3 |
| Kilmarnock | .. | arr. | 36.20 | |
| „ | .. | dep. | 50.51 | |
| Post 36.. | .. | pass. | 55.18 | |
| „ 37.. | .. | „ | 56.53 | |
| „ 38.. | .. | „ | 58.43 | 32·7 |
| „ 39.. | .. | „ | 1. 0.40 | 30·8 |
| „ 40.. | .. | „ | 2.40 | 30 |
| „ 41.. | .. | „ | 4.34 | 31 |
| „ 42.. | .. | „ | 6.11 | 37 |
| „ 43.. | .. | „ | 7.30 | 45·6 |
| „ 44.. | .. | „ | 8.47 | 46·7 |
| „ 45.. | .. | „ | 10. 5 | 46·1 |
| „ 46.. | .. | „ | 11.30 | 42·3 |
| „ 47.. | .. | „ | 12.58 | 40·9 |
| „ 48.. | .. | „ | 14.28 | 40 |
| „ 50.. | .. | „ | 17. 8 | 45 |
| „ 51.. | .. | „ | 18.32 | 42·8 |
| „ 52.. | .. | „ | 20. 2 | 40 |
| „ 53.. | .. | „ | 21.28 | 41·8 |
| „ 54.. | .. | „ | 22.48 | 45 |
| New Cumnock | .. | „ | 25.25 | pilot detached speed 2 m.p.h. |
| Post 55.. | .. | „ | 25.48 | |
| „ 56.. | .. | „ | 27.41 | |
| „ 57.. | .. | „ | 29.21 | |
| „ 58.. | .. | „ | 30.44 | 43·4 |
| Post 59.. | .. | pass | 32. 1 | 46·7 |
| „ 60.. | .. | „ | 33.16 | 48 |
| „ 61.. | .. | „ | 34.24 | 52·9 |
| „ 62.. | .. | „ | 35.29 | 55·4 |
| „ 63.. | .. | „ | 36.31 | 58·1 |
| „ 64.. | .. | „ | 37.36 | 55·4 |
| „ 65.. | .. | „ | 38.43 | 53·7 |
| „ 66.. | .. | „ | 39.50 | 53·7 |
| „ 67.. | .. | „ | 40.55 | 55·4 |
| „ 68.. | .. | „ | 41.54 | 61 |
| „ 69.. | .. | „ | 42.53 | 61 |
| „ 70.. | .. | „ | 43.51 | 62·1 |
| „ 71.. | .. | „ | 44.54 | 57·1 |
| „ 72.. | .. | „ | 45.56 | 58·1 |
| „ 73.. | .. | „ | 47.10 | 48·6 |
| „ 74.. | .. | „ | 48.29 | 45·6 |
| „ 75.. | .. | „ | 49.43 | 48·6 |
| „ 76.. | .. | „ | 50.53 | 51·4 |
| „ 77.. | .. | „ | 51.58 | 55·4 |
| „ 78.. | .. | „ | 52.59 | 59 |
| „ 79.. | .. | „ | 53.58 | 61 |
| „ 80.. | .. | „ | 54.54 | 64·3 |
| „ 81.. | .. | „ | 55.48 | 66·6 |
| „ 82.. | .. | „ | 56.44 | 64·3 |
| „ 83.. | .. | „ | 57.45 | 59 |
| „ 84.. | .. | „ | 58.43 | 62·1 |
| „ 85.. | .. | „ | 59.40 | 63·2 |
| „ 86.. | .. | „ | 2. 0.38 | 62·1 |
| „ 87.. | .. | „ | 1.36 | 62·1 |
| „ 88.. | .. | „ | 2.33 | 63·2 |
| „ 89.. | .. | „ | 3.34 | 59 |
| „ 90.. | .. | „ | 4.36 | 58·1 |
| „ 91.. | .. | „ | 5.40 | 56·2 |
| Dumfries | .. | arr. | 2. 7.18 | |

There was some curiously uneven running with this train. In spite of the assistance of

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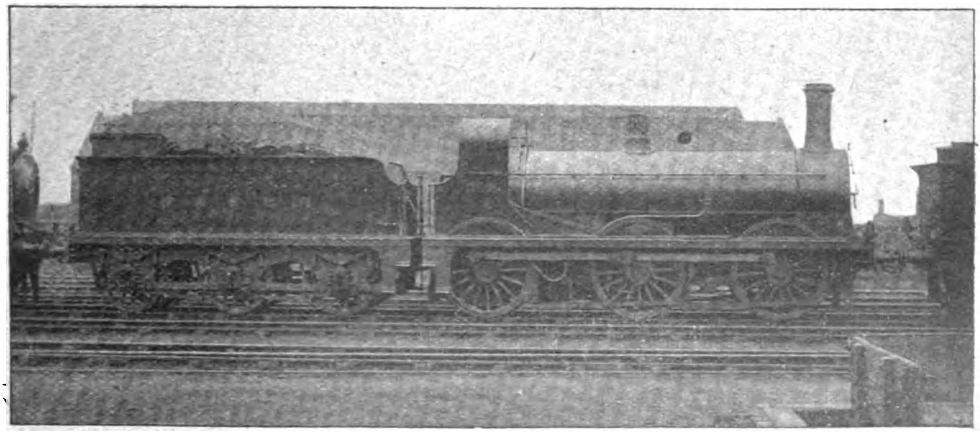
the pilot engine 1 min. 20 sec. were dropped between Glasgow and Kilmarnock for reasons which I do not know. At Kilmarnock there was a long wait for connecting trains which were late, but the two engines did not unduly hurry themselves in climbing the 1 in 100 rise from Hurlford to Mossgiel tunnel. The time allowance from Kilmarnock to Dumfries was 67 min., on which 33 sec. were gained in spite of the almost dead stop at New Cumnock and a reduction of speed at the 73rd post.

At Dumfries another pilot was attached—one of the old 7 ft. singles of Mr. Patrick Stirling's design—and the 33 mile run to Carlisle was done in 39 min. 21 sec. (booked time 41 min.). The details of this portion of the run are not of any great interest. Speed was maintained fairly steadily at 52 to 58 miles per hour and reached 60 only for two miles on Caledonian metals after passing Gretna. The run is given, not as a performance of any special merit, but as a record of the average work of that period.

No. 65, one of the Smellie bogie engines, was practically destroyed in a disastrous collision at Barassie Junction near Troon in 1898, where a fast goods train from Ayr ran into a Kilmarnock passenger train. The engine had to be almost entirely reconstructed as a new one, whilst of the goods engine No. 49, a number of small bits were about all that remained. It was a collision carried out with great thoroughness, but unfortunately there was a considerable loss of life.

Mr. Smellie built no new tank engines for passenger traffic, the dearth of which I have previously mentioned. But he made an attempt at remedying matters by rebuilding some of the older 0–4–2 goods engines as 0–4–2 "side tanks." The first lot of these were Nos. 116–7, 121–2, and 127 to 130 of Mr. Patrick Stirling's 1860–1 design with 5 ft. wheels and 16 in. by 22 in. cylinders, and they were used on local passenger trains in the immediate outlying parts of Glasgow. These engines lasted for a few years and were then replaced by a larger class of rebuilds mostly numbered between 195 and 206. These were converted from the 0–4–2 fast goods engines bearing these numbers, which had 5 ft. 7 in. wheels and 17 in. by 24 in. cylinders. But the Glasgow and South Western is not a healthy line for tank engines, and their lives were comparatively short. It is, moreover, probable that the severe electric tramway competition which sprang up towards the end of the century did a good deal towards spoiling the suburban efforts of the Glasgow and South Western tank engines. None of these rebuilds are now at work.

Mr. Smellie's goods engines, one of which, No. 294, is illustrated below, were very much of the design of the 1877 "Black goods" No. 41 class, and there were in all 64 of them, of which 44, bearing odd numbers and replacing older engines, were built at Kilmarnock between 1881 and 1891. Of the other twenty, ten, Nos. 281 to 290, were constructed by Neilson & Co. in 1883, and Nos. 292 to 301 by Dübs & Co. in 1889.



GOODS ENGINE NO. 294 (H. SMELLIE).
Coupled wheels, 5 ft. 1 in. Cylinders, 18 in. by 26 in.

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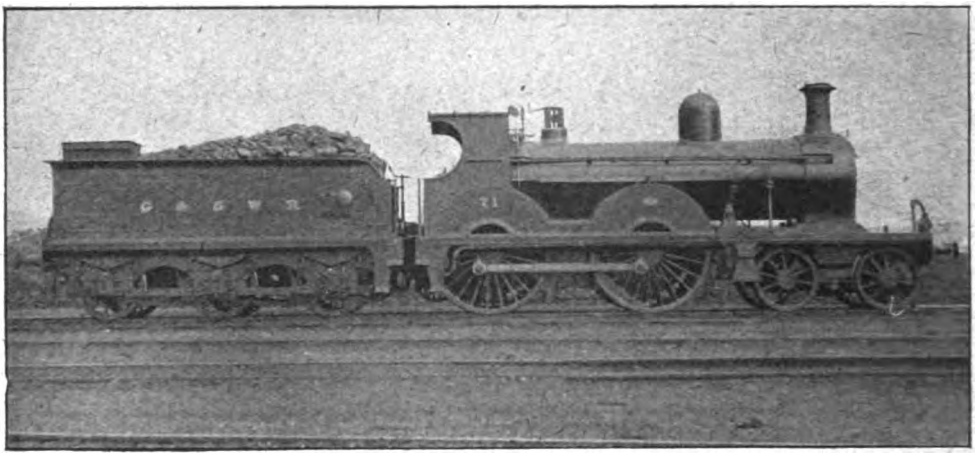


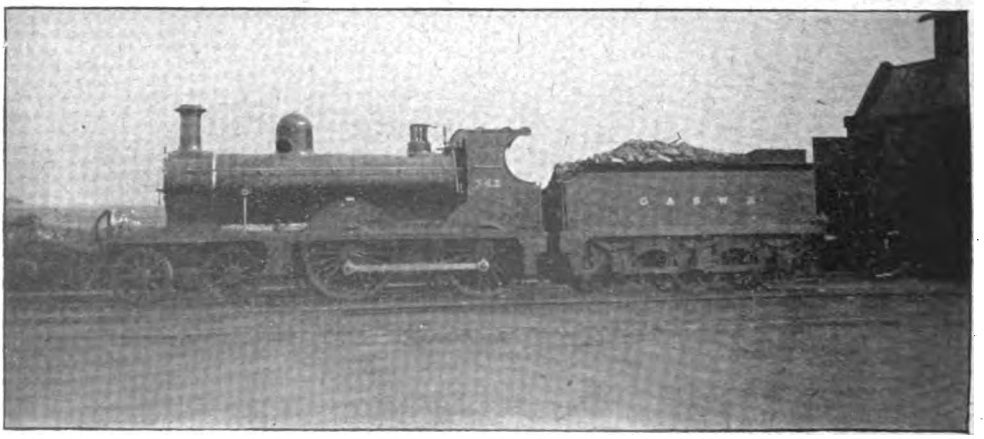
*Photo]* [*A. Robinson.*

4-4-0 ENGINE NO. 71 (J. MANSON).
Coupled wheels, 6 ft. 9 in. Cylinders, 18½ in. by 26 in.

They were all of the six wheels coupled type with 5 ft. 1 in. wheels, 18 in. by 26 in. cylinders and the standard domeless boilers. The heating surface of the 281 class was 1,061 sq. ft., and their weight nearly 37½ tons. Although Mr. Smellie carried on many of the Stirling traditions, he did not "take any stock" in four wheels coupled goods engines, the last of which were built in 1878.

During the summer of 1888 the speed of the Scotch trains was increased on all lines, chiefly as a result of the Edinburgh race of that year. The up day Glasgow Scotch express was from that period booked to cover the 115½ miles to Carlisle in 2 hours 30 min., with the usual Kilmarnock and Dumfries stops. The booked speed from Glasgow to Kilmarnock was 44¼ m.p.h., from Kilmarnock to Dumfries 48½ m.p.h. and thence to Carlisle at 50¾ m.p.h. These speeds represented really good locomotive work over such a heavy road. The coast trains from Glasgow had also been accelerated; the best of these ran from Glasgow to Ayr, 40¾ miles, in 1 hour with one stop, the running speed being 42 m.p.h.

At about this time the Glasgow and South Western executed a somewhat remarkable *volte face* on the brake question. For a good many years the Westinghouse was the standard brake on the line, and most of the



*Photo]* [*A. Robinson.*

4-4-0 ENGINE NO. 342 (J. MANSON) FOR THE GREENOCK LINE.
Coupled wheels, 5 ft. 9 in. Cylinders, 18 in. by 26 in.

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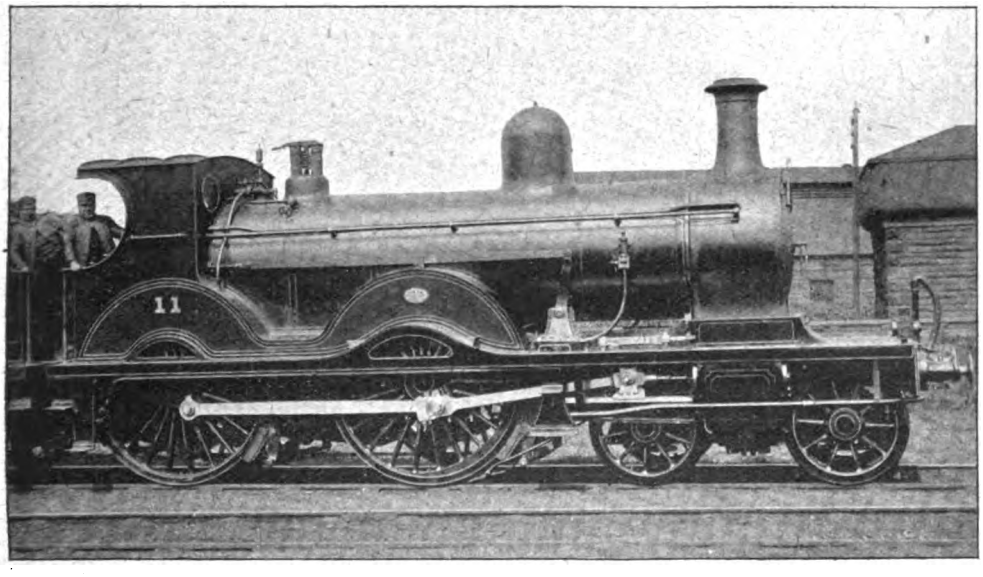
passenger engines, were fitted with it. Then the automatic vacuum was suddenly adopted. "Thereby hangs a tale" which I do not suppose will ever be fully told. The relations of this line with its English partner —the Midland—were then very intimate, and they even shared one Chairman between them. The battle of the brakes was largely fought on the Midland, who had their own reasons for adopting the vacuum after having almost become a Westinghouse line. I fancy that a good deal of quiet pressure was brought to bear on the Scottish partner, but, whatever the underlying cause, the net result was the sudden change of brakes mentioned above.

Glasgow and South Western. Whatever the Act of Union had intended, it certainly had not contemplated such an enormity as this. So the "Scots wha hae wi Wallace bled," or rather their descendants, would have none of it; the amalgamation scheme fell through, and the Derby Sassenach has had to remain on the Carlisle side of the border, at least in regard to the Glasgow and South Western Railway.

There is, however, a line of railway in Kirkcudbrightshire and Wigtownshire known as the Portpatrick and Wigtownshire Joint Line, which, starting from Castle Douglas, runs for 60¾ miles to Portpatrick, taking in Stranraer on the route, and also has a branch line nearly




*Photo*] [*G. F. Burtt.*

NO. 11 FOUR-CYLINDER EXPRESS LOCOMOTIVE BUILT BY MR. MANSON IN 1897.
Coupled wheels, 6 ft. 9 in. Cylinders, outside, 12½ in. by 24 in.; inside, 14½ in. by 26 in.

After this the relations between the two railways became still more cordial, until amalgamation was openly spoken of, and was at one time considered to be almost as good as completed. Then a hitch occurred. The Glasgow and South Western is, after all, a Scottish railway, and the national opposition from north of the border waxed strong. It was one thing to annex the kingdom of England by giving a thorough overhaul and a fresh coat of paint to James VI. of one country and then renumbering him James I. of the other, but it was quite a different matter when an English railway company proposed to take over and control such an essentially Scottish institution as the

20 miles long to Whithorn. It is, I should say, about the "jointest" line in the kingdom of any length, being owned by no less than four companies, the Glasgow and South Western and the Caledonian of the Scotch lines, and the London and North Western and the Midland of the English. To this extent, therefore, the two English railways are over the border,* but they do not work the trains, this function being allotted to the two Scotch railways starting from Dumfries. For many years the Midland has run a sleeping saloon from St. Pancras

* The Midland is also a partner in the Forth Bridge.—Ed. R.M.

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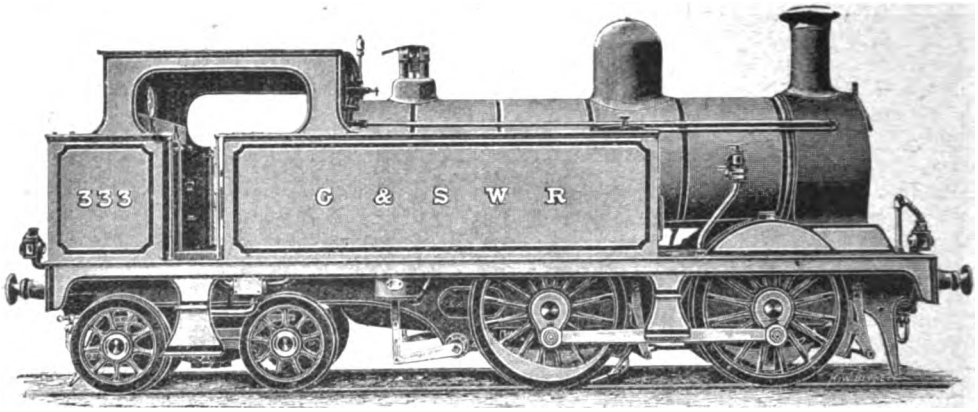


0-4-4 TANK ENGINE, DESIGNED BY MR. JAMES MANSON.

to Stranraer by the night Scotch express.

The locomotives of the old Portpatrick line were interesting from the fact that several of them were designed by Mr. McConnell, of London and North Western "Bloomer" fame, just before he left this company, and there were two singles of the small "Bloomer" style running on it. But for some reason which I do not know, the Caledonian annexed the engines, and therefore they do not enter into the Glasgow and South Western story.

In 1890, or thereabouts, the Glasgow and South Western took over a cross-country line from Girvan on the coast to Challoch Junction, some 8 miles from Stranraer on the joint railway. This was at one time called the Girvan and Portpatrick Railway, but blossomed out later as the Ayrshire and Wigtownshire Railway. It had been managed by Mr. Wheatley, previously the Locomotive Superintendent of the North British Railway, and was generally known in the district as "Wheatley's line." There were seven engines at work on it, of which Nos. 1, 2 and 3 were old North London tank engines of the 4-4-0 type, with inside cylinders. They had originated at the works of Slaughter & Co., of Bristol (afterwards the Avonside Engine Co.) in 1860, and were fairly ancient by the time the North London people persuaded the Scotchmen to buy them. I believe the Glasgow and South Western broke two of them up at once, unless they sold them to somebody else. The other, I understand, became R10 on the Glasgow and South Western, and shunted at Girvan for some years. There were, however, four modern engines on the Ayrshire and Wigtownshire designed by Mr. Wheatley; two of these were built by Neilson & Co. in 1886, and the other two by The Clyde Locomotive Works, Glasgow, in 1887. These were six-coupled tender engines with wheels 5 ft. 1 in. diameter, cylinders 17 in. by 26 in., and 1,065 sq. ft. of heating surface. They became Glasgow and South Western Nos. 302 to 305, and spent their existence at Girvan on this line. Whether they are still at work I do not know, but if not, they have been broken up only recently.

In 1891 Mr. Smellie left Kilmarnock to take up the chieftainship of the Caledonian Locomotive Department at St. Rollox, and I am sorry to add that he had hardly had time to settle there when he joined the great majority. With his departure from Kilmarnock the era of domeless locomotives came to a close, after a run of nearly 40 years. Other Stirling features also underwent a change, notably the plain cabs. The position of Chief Locomotive Engineer passed into the care of Mr. James Manson, who reigned at Kilmarnock for about 22 years, to which may be added that for some years previously he had been chief of the Great North of Scotland Locomotive Department at Kittybrewster.

Mr. Manson immediately put in hand an army of 4-4-0 express engines, which issued from Kilmarnock works in a steady stream for the 20 years from 1892 onwards. As there are between 80 and 90 of these engines with isolated numbers, I do not propose giving the list of them. By the end of last century there were some 46 of them in service. Those built recently have larger boilers.

The cylinders are 18¼ in. by 26 in., and the coupled wheels are 6 ft. 9⅛ in. diameter. The heating surface of the tubes is 1,094 sq. ft.

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and of the firebox 111 sq. ft., total 1,205 sq. ft. The boiler pressure of the earlier ones of the class was 150 lb.,* and their weight 45 tons 1 cwt. in working order. The tenders of the earlier engines had a capacity of 2,500 gallons of water, but two of the class, Nos. 77 and 78, came out in 1893 with eight-wheeled tenders of a peculiar design. The front end of the tender was carried on a four-wheeled bogie and the back end on four wheels with rigid axles of the usual form.

The Manson engines immediately took up the main line work, and were stationed principally at Glasgow, with several at Carlisle. Now they are to be found everywhere on the system.

An important difference between the Manson and the Smellie engines lay in the motion of the two classes. The Smellie engines have direct motion with the valves between the cylinders, whereas the Manson engines have the valves on the top of the cylinders driven by rocking shafts.

A few samples of their performances may be of interest, but, unfortunately, individual records with one engine are spoiled as such owing to the necessity for piloting the heavy trains over the greater portion of the main line.

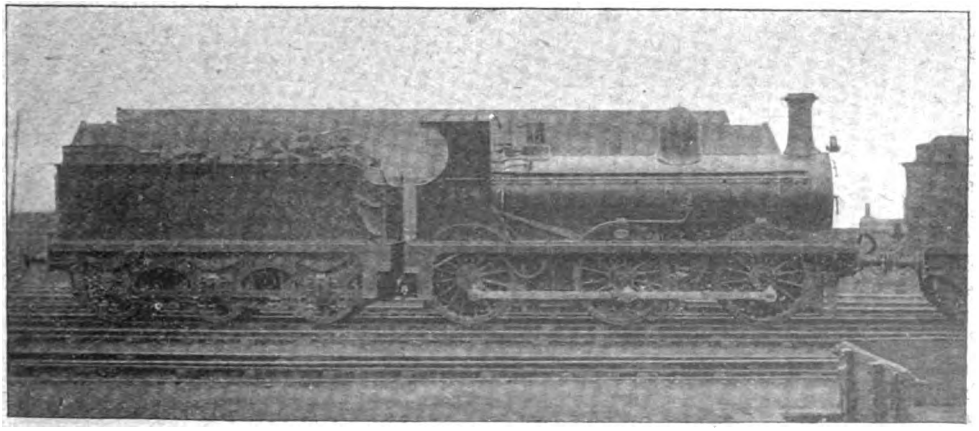
With engine No. 4 (Manson) piloted by No. 52 (Smellie) and a moderate load of about 160 tons, we took 47 min. 5 sec. to mount the long bank to New Cumnock, a distance of 39 miles from Dumfries. The 21⅛ miles from New Cumnock to Kilmarnock (with both engines) was covered in 21 min. 43 sec. to the dead stop, the fastest mile from the 38th to the 37th post taking 53 sec. The whole distance of 58⅛ miles took 68¾ min., a running average of 50¾ m.p.h.

On another occasion two Manson engines took the down day Scotchman with 220 tons from Carlisle to Dumfries (33 miles) in 38 min. 1 sec. From Dumfries the time to the New Cumnock summit was 44 min. 32 sec., a much better performance than the previous one, although the load was much heavier. The lowest speed up the 1 in 150 bank was 40 m.p.h. The 21⅛ miles from New Cumnock summit down the bank to Kilmarnock were covered in 20 min. 50 sec., the running being excellent. The pilot engine on this occasion was put off at Dunlop instead of going through to Glasgow.

The afternoon corridor diner from St. Pancras was booked to run through from Carlisle to Kilmarnock—91½ miles—without stopping at Dumfries except "conditionally," and with one of the Manson engines and a load of 175 tons this run was made in 101 min. In view of this and of one or two other experiences, I am inclined to think that the pilot engine was occasionally taken when it might have been dispensed with, but I suppose it was the start from Dumfries, where most of the trains stopped that controlled the question.

But the Manson 6 ft. 9 in. express engines were not the only 4–4–0 engines built during that gentleman's superintendency. There used to be a homely—and probably inaccurate—rule for tyros at whist to the effect that "when in doubt play trumps." There seems to have been a similar rule at Kilmarnock, "when in doubt build a 4–4–0 engine," and they not only carried it out by building

* Later engines had 165 lb. pressure.



MR. MANSON'S STANDARD GOODS CLASS (1898–9).
Coupled wheels, 5 ft. 1 in. Cylinders, 18 in. by 26 in.

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one, but a very large number. I believe the Glasgow and South Western has a much larger proportion of 4-4-0 engines per mile of line than any other railway, although I have not made the exact calculation, and am open to correction if I am wrong.

For the heavy gradients of the "Coast" trains on the Greenock section of the line, Mr. Manson built two classes of this type, of which Nos. 336 to 345 (Dübs & Co., 1895) have 5 ft. 9 in. wheels with 18 in. by 26 in. cylinders, whilst Nos. 346 to 360 (Dübs & Co., 1899) have 6 ft. 1 in. wheels, and 18¼ in. by 26 in. cylinders. One of the latter—No. 358—was in 1900 thrown off the line on the Inchgreen branch on to the foreshore at Greenock by taking the wrong road, so that instead of climbing a bank of 1 in 75 as it ought to have done, the engine went full tilt down a steep gradient of 1 in 55. It has been stated that the bogie wheels of the engine completely disappeared and have never been recovered.

One more 4-4-0 engine of the last century demands some notice, *viz.*, No. 11, the four-cylinder engine built by Mr. Manson in 1897. This was contemporaneous with Mr. Webb's first four-cylinder engines on the London and North Western, though there was no connection between the two. Mr. Manson's engine has four high pressure cylinders, of which the outside ones are 12½ in. by 24 in., and the inside ones 14½ in. by 26 in. The coupled wheels are 6 ft. 9½ in. in diameter, and the boiler had the same heating surface as the standard 4-4-0 engines, *viz.*, 1,205 sq. ft., though the pressure was increased to 165 lb. per sq. in. The volume of the cylinders is only about 1·06 times the volume of the 18¼ in. by 26 in. cylinders of the standard engines; nevertheless, the engine would probably have been improved by a larger boiler. I never had any personal experiences in trains worked by No. 11, and am, therefore, not in a position to say anything as to its merits. If any of the readers of the RAILWAY MAGAZINE have any details of runs made by this engine they would be of interest. No. 11 remained the only four-cylinder engine on the line, and Mr. Manson never repeated the experiment. When I saw it, No. 11 was working main line trains to Carlisle, and I note from the recent correspondence that it has recently been supplied with a new large boiler, so that perhaps we may hear something more of it.

It cannot be said that the tank engine conundrum was thoroughly solved during the earlier years of Mr. Manson's superintendency nor for that matter did it appear to be much further advanced when that gentleman resigned. But, at all events, he did a little more towards the solution than his predecessors, for in 1893 Messrs. Neilson constructed 10 very handsome-looking though moderate-sized 0-4-4 side tanks for Glasgow local traffic, which took the places of the old rebuilt 0-4-2 tanks on some of the Paisley and Johnstone trains. These engines, Nos. 326 to 335, have 5 ft. 2 in. wheels, 17½ in. by 24 in. cylinders, and 150 lb. pressure, and they represent the last attempt of the Glasgow and South Western in the direction of passenger tank engines.

But shunting tank engines fared even worse. Four small 0-6-0 side tank engines built in 1896 with 16 in. by 22 in. cylinders represented the total effort in this direction up to the close of the century, and even the latest returns for 1915 show only fifteen 0-6-0 tank engines. It is true that they were supplemented by a very small squad of "pugs"—four-wheeled engines with outside cylinders, some four or five in number, which had been picked up in various quarters. Tank engines are certainly not a strong feature of the Kilmarnock *répertoire*.

Mr. Manson's goods engines, like his passenger engines, have domed boilers. One of them, No. 174, is illustrated on page 263. They have the standard dimensions of 18 in. by 26 in. cylinders, and 5 ft. 1 in. wheels. I understand that the first series, Nos. 306 to 325, built by Messrs. Dübs & Co. in 1892, were of Mr. Smellie's design, in which Mr. Manson substituted domed boilers. Nos. 160 to 169, and 172 to 179, came out in 1898-9 from Kilmarnock works, and at the close of the century Messrs. Neilson built Nos. 361 to 380 in 1900. The later engines carry 165 lb. pressure. A considerable number of these goods engines have been added since, some of them with larger boilers. Those of the 361 class have 1,208 sq. ft. of heating surface, and the engines weigh 42 tons 17 cwt. in working order.

At this point I leave the Glasgow and South Western. The chronicles of Kilmarnock are now in the able hands of Mr. Peter Drummond, who has already introduced several new and very interesting features into their pages, including some handsome 0-6-2 tank engines.

A correspondent writes that No. 149A, one of the Stirling 0-4-2 goods engines described last month, and built by Neilson's in 1865, is still at work.

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# British Electrical Progress and Practice.

## AN ALL-ELECTRIC MAIN LINE RAILWAY OF THE FUTURE [No. IV.]

By "INDICATOR."

IN this section the lay-out of lines between Carling Road, Ashford Junction and Norford Junction, and Stella Road must first be considered; but in view of the attention already given to the signalling equipment, there is no need to deal with the signals installed.

Diagram V. shows the main features, but general aspects may first be referred to in conjunction with the key plan inserted. The main line sends out branches from Carling Junction towards Daisyfield Junction and Albert Park, also across to Norford Junction, while at Ashford South Junction a connection is made from Stella Road and Osborn Street. At Ashford Central Junction the line from Norford Junction makes connection, and at Ashford Junction station (Ashford North) the Burn Road branch is put forward, giving access to the Western lines, this route being served mainly by trains to and from Osborn Street.

From Stella Junction Osborn Street trains can proceed to Norford Junction, while from Ashford Middle Junction is a route across to Daisyfield Junction. Goods trains have independent routes from Burnett Place to the Daisyfield Junction route, to the Ashford Middle Junction—Daisyfield Junction route, and to Ashford Junction. They are distinct from the main lines as far as Tillingford. Exclusively goods lines are indicated dotted on the key plan.

Dealing now with the main diagram, at Carling No. I. Junction a down branch line rises between the two down lines; and then divides at No. II. Junction on the upper structure towards No. III. or towards Norford Junction. At No. III. a division is made towards Daisyfield Junction or to the Down Auxiliary lines. Corresponding up junctions are provided as indicated. From the goods lines a separate branch is given towards Daisyfield Junction, with distinct goods roads as far as St. Ann's Junction; but goods trains reach Norford Junction by a route distinct from that of the passenger trains.

Further along a fly-over is erected to transpose the Down E.S. and Up Fast lines, and at Ashford South Junction a fly-over brings Osborn Street trains to or from Burn Road to the Up and Down Auxiliary lines, while a spur connects them also to the Up and Down E.S. lines from main line routes. There is also a connection to the goods lines, which have been continued from Carling Goods Junction *viâ* St. Stephen's Junction, Triangle Junctions Nos. I. and III. (No. II. connects to Ashford Middle Junction), to Ashford South No. III.

At Ashford Central Junction a direct route is given from Norford Junction, and connections from Goods to E.S., E.S. to Fast, and Fast to Auxiliary are also available. At Ashford North Junction there are connections from Goods to Main Line Slow (hitherto E.S.), E.S. to Fast Main Line, Fast Main Line to Burn Road Fast, and Auxiliary to Burn Road slow or fast. Connections and details of the two sets of goods sidings and the mineral sidings noted are not given.

It will therefore be seen that up and down fast trains have a clear road right through this series of inter-connecting lines, the few branch trains at Carling Junction No. I., which are run *viâ* the fast lines, being clear of opposite direction fast trains. Similarly Osborn Street trains affect only the Auxiliary or the E.S. lines, according to which route they are on, and if running towards Burn Road are carried across to the Auxiliary lines clear of other tracks. The direct-route from Norford Junction to Ashford Junction is mainly used by locals to Tillingford, and they are not very numerous, so that, as a rule, they affect only the goods and E.S. lines, the latter as they become "main line slow" tracks.

Speaking generally, trains from Norford Junction proceeding to Burn Road transfer from Goods to E.S. at Ashford Central and



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at Ashford North to Burn Road Fast. On the main routes Auxiliary line trains take the slow lines towards Burn Road, though they can be diverted to the fast lines, without affecting the main lines at all. Down fast line trains diverging towards Burn Road turn off at Ashford North.

Although very full means of inter-transfer are provided along this section of line, it is worthy of note that relatively few of them are systematically used. Indeed, it is mainly certain fast or semi-fast suburban trains at business hours, specials, and stock, milk and like trains which use them.

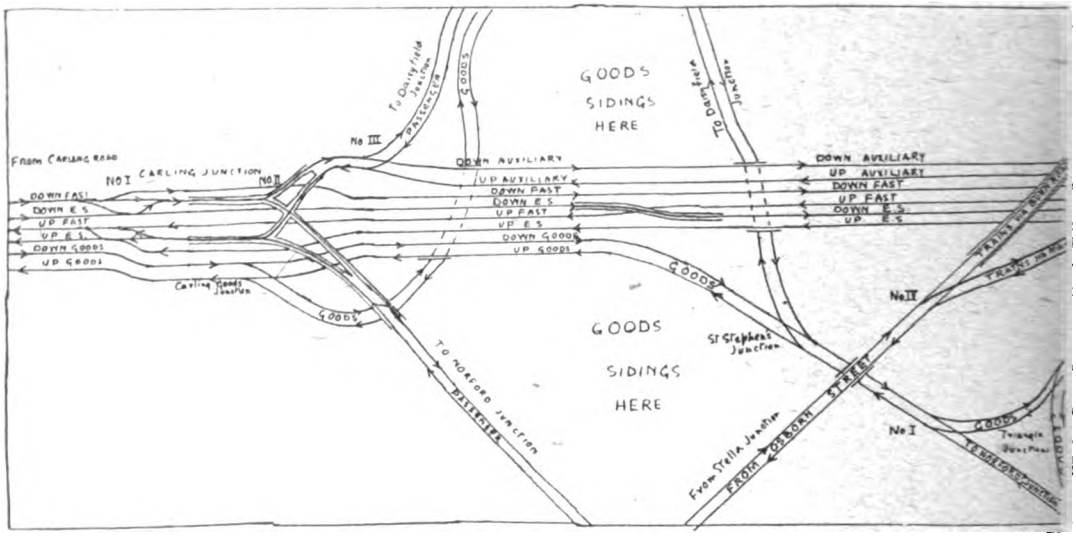


DIAGRAM V. LAY-OUT BETWEEN CARLING

The standard routes concerned are :—

(1) Main line trains and Arklow Expresses : Fast main lines throughout.
(2) Central–Steynbrook or Mannington locals : E.S. and Main Line Slow lines throughout.
(3) Central—North and South Bentley locals : E.S. to Carling Junction No. I. and No. II., thence across to Norford Junction.
(4) Central to Albert Park : E.S. to Carling Junction No. I., No. II. and No. III., and thence to Daisyfield Junction.
(5) Central to Notbrook : E.S. to Carling Junction No. I., No. II., No. III., Auxiliary, and thence to Burn Road slow lines.
(6) Osborn Street to Steynbrook locals : Stella Junction, Ashford South No. IV. and No. II. to E.S., and thence slow main lines.
(7) Osborn Street to Notbrook : Stella Junction, Ashford South No. IV. and No. I. to Auxiliary, thence to Burn Road slow lines.
(8) Osborn Street to North and South Bentley : Stella Junction to Norford West Junction.
(9) North and South Bentley to Tillingford : Norford West Junction, Ashford Middle Junction, Ashford Central Junction, thence to E.S. and main line slow roads.
(10) North and South Bentley to Albert Park : Norford West Junction, Ashford Middle Junction, and Triangle Junctions Nos. II. and I., St. Stephen's Junction, and thence to Daisyfield Junction.

Occasional Central–Exholme semi-fasts take the fast lines to Ashford North and thence Burn Road fast, while Osborn Street fasts to the Western lines travel *viâ* the Auxiliary lines and thence Burn Road fast ; but these trains are not numerous. Indeed, the Burn Road fast lines are in practice little used ; and as often as not are utilised for loading or unloading milk and parcels trains. Most of the other inter-connections available are used only by particular trains, and as may be convenient. A general rule is that a double crossover is never made in one stage if it can be avoided, the first stage

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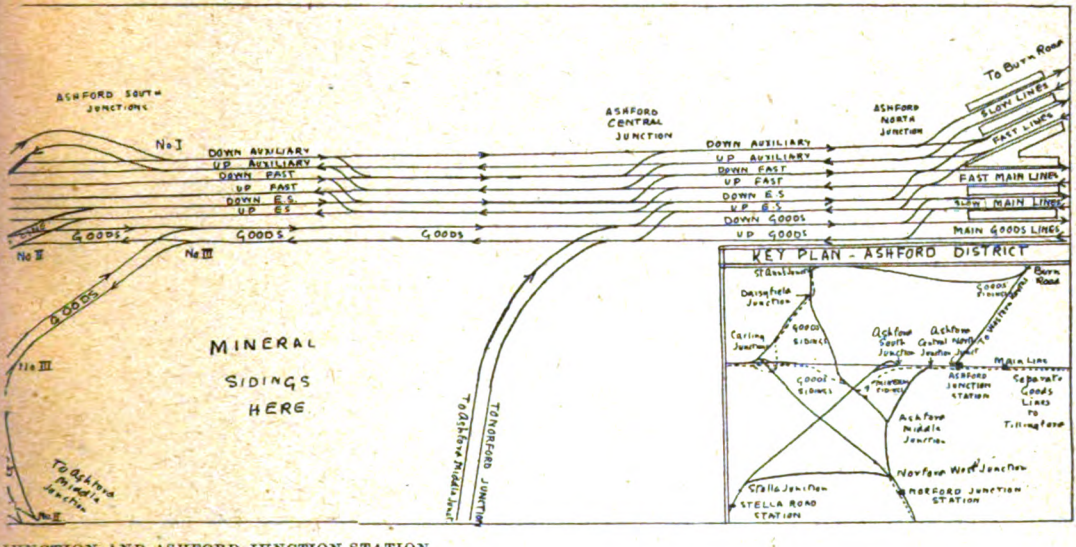
being made at one junction and the second at another.

Goods trains have entirely independent lines from Moortown to Carling Goods Junction, and except between St. Stephen's Junction and Triangle No. I. can be run clear of all passenger routes to Ashford Junction main line as far as Tillingford.

Towards Burn Road the usual route for goods trains is Carling Goods, under the main lines continuing alongside the passenger route to Daisyfield Junction, and thence from St. Ann's Junction to Burn Road. Through trains are, however, occasionally run *viâ* the main goods lines to Ashford Ingleton distinct goods lines are available. In practice a large proportion of the goods trains run only between Moortown and other goods depôts in town; Albert Park (exchange with the West Midland Railway); the Bentley routes; and the goods and mineral sidings in the Ashford district; the main line services radiating therefrom. The Burn Road sorting sidings constitute an auxiliary centre for goods trains.

So much for the main line features in the Rayhampton area. A few remarks are now necessary in reference to certain stations elsewhere, bearing in mind that a ruling principle everywhere has been to secure a




JUNCTION AND ASHFORD JUNCTION STATION.

Central, thence to E.S. and to Burn Road fast lines. From Osborn Street goods trains follow the ordinary passenger routes; but from Norford Junction to Ashford Junction the usual goods route is *viâ* the Triangle Junctions and Ashford South No. III.

Osborn Street is a five-platform terminal, served mainly by car trains. The standard services are (1) to Oxwell; (2) to Norford Junction; (3) to Steynbrook; (4) to Notbrook, with a few fast trains to Exholme and along the main line, but not to Mannington and Arklow, the "Marsden" Railway services being confined to the Central station, in view of the Arklow Company's "Victoria" terminus being close to Osborn Street. From Osborn Street to Ashwell Junction is four-track, and two-track beyond. From Norford West Junction to clear run-through for express traffic, and for standard slow traffic; at the same time giving as much freedom as practicable to goods traffic and avoiding all causes of congestion and delay. It has to be borne in mind, too, that a substantially hourly group of expresses is operated on the main routes, and that it has not as yet become practicable to provide separate goods lines quite everywhere; hence an important object in designing every principal station location has been to clear the through lines as quickly as possible and to allow as many train movements as practicable to occur without conflicting with any others. Diagram VI. shows the lay-out of four of the more important stations within the Rayhampton suburban area. At Stoneford Junction two routes join, from

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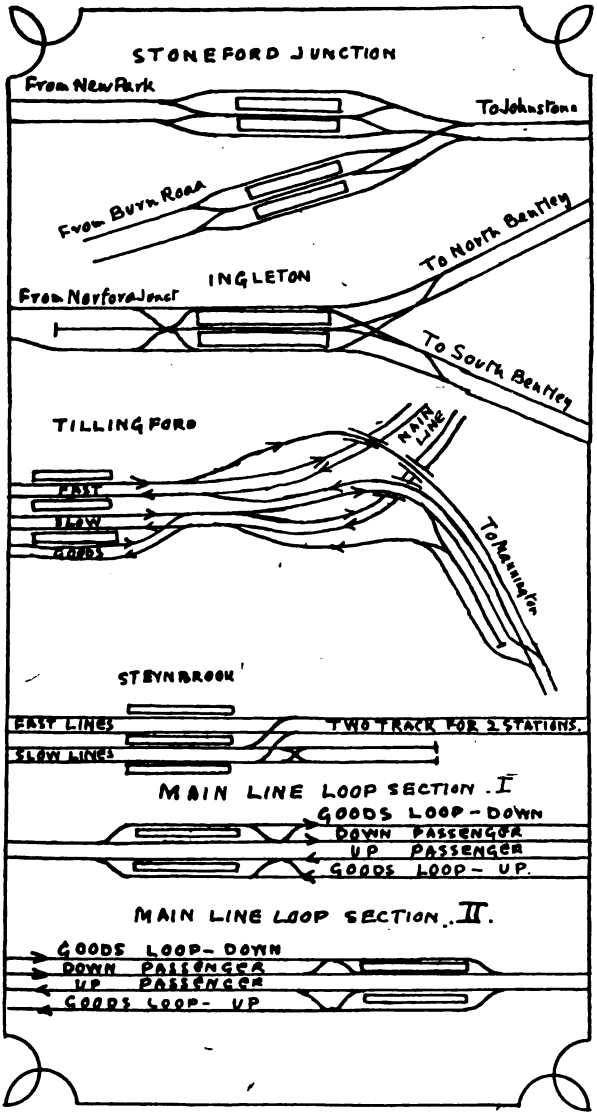


DIAGRAM VI. SELECTED SUBURBAN STATIONS IN THE RAYHAMPTON AREA.

New Park and from Ashford Junction, each of these being served by local trains terminating at Stoneford Junction, with through trains on each route. As the trains are either multiple-unit car sets or locomotive operated carriage sets with driver's control compartment in rear, there is no need to provide for engines running round trains, though this can be done if need arise. Hence each route has a central terminal road between island platforms, convenient for exchange. Each centre road can also, if required, be used to enable one train to pass another, track circuiting and interlocking preventing conflicting action.

At Ingleton there are two islands and a centre road; but as a rule the latter is only employed as an auxiliary for either direction trains should a same-direction train not have cleared the station before another is ready to enter. The lay-out adopted was provided some years ago when it was proposed to run shuttle trains to South Bentley in connection with North Bentley through trains, and *vice versa*. On Sundays the South Bentley route is mainly served in this way; but with the multiplication of trains such methods have proved unnecessary on week-days.

Tillingford is laid out with flying junctions so that Mannington local and Arklow express trains can run independently of all tracks not immediately concerned; while a centre terminal road along the branch provides for reversing the Norford Junction – Tillingford locals. At Tillingford the separate goods lines come to an end, trains thence passing on to the slow lines.

Steynbrook is the end of the four-track main line from Rayhampton, the local lines terminating in spurs available for reversing, this being the destination of most of the local trains.

As mentioned, owing to the generous train service provided along the main routes, there are no long intervals available for the running of goods trains, and to facilitate their working at several places along the main lines goods loops are constructed from one station to the next. At the stations these provide loop platform lines so that passenger trains can pass, and if necessary stopping passenger trains can be run *viâ* the goods lines. The connections are such that a train can be turned on to the goods loop at either end of the station. Consequently, a goods train can be diverted to the loop after passing through the main platform, and immediately it has cleared the crossover a passenger train from the loop platform can depart *viâ* the main line; while it is practicable for either a passenger or goods train

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to be running on the loop while an express is following and overtaking it, so that no delay is occasioned to either. In some cases the down loops do not correspond with those on the up side, the arrangement adopted being that found most satisfactory according to the characteristics of traffic to be provided for.

All traffic being operated electrically, rapid acceleration is obtained, and this, with a majority of the goods trains relatively short and operated on fairly fast schedules, enables every facility of this kind to be utilised to the full. Between Steynbrook and Stuart three loops are provided, from Carlton Hill to Oxbridge (1¾ miles), Benwell Junction to Ellingbank (3 miles), and Blakewell to Stuart. Onwards to Caxton there is a down loop from Lanwell to Chagford (2½ miles) and an up loop from Lanwell to Stuart (2½ miles); but from Notting to Caxton the goods lines are entirely separated, and continue so through the Caxton goods yards and independently towards Marsden and towards Belmont for one station.

Diagram VII. shows the main features of Stuart, Caxton and Marsden (North Square) stations. At Stuart the junction towards Alford-on-Sea and Seastone is a reverse one, the direct loop being used only for goods and special trains; all ordinary trains calling at Stuart, whether partially or exclusively for the branch. From Blakewell to Stuart is four-track, owing to the provision of goods loops, and at the station these widen into centre through lines and double platform lines serving the down and up islands. Thus a down express can pass at full speed while a Belmont and Seastone express is being divided, and with a terminating train also in the station. A terminal spur permits of still a fourth down train being placed out of the way, the whole involving no interference whatever with up traffic, unless by shunting. Crossing over of reversing trains is, of course, done at convenient intervals.

Immediately a combined train has been divided, the Seastone and Alford section can be sent off at once with its rear locomotive, the burrowing junction giving it a clear passage independent of main line traffic. In combining trains the rule is that the second part must not be brought in until the first is at a stand; but the second is then joined up, usually with locomotive in rear, so that it is only the necessity for attaching or detaching vehicles, or changing the positions of locomotives that calls for shunting, and that need not affect the up through line.

As the tracks are reversed in order the

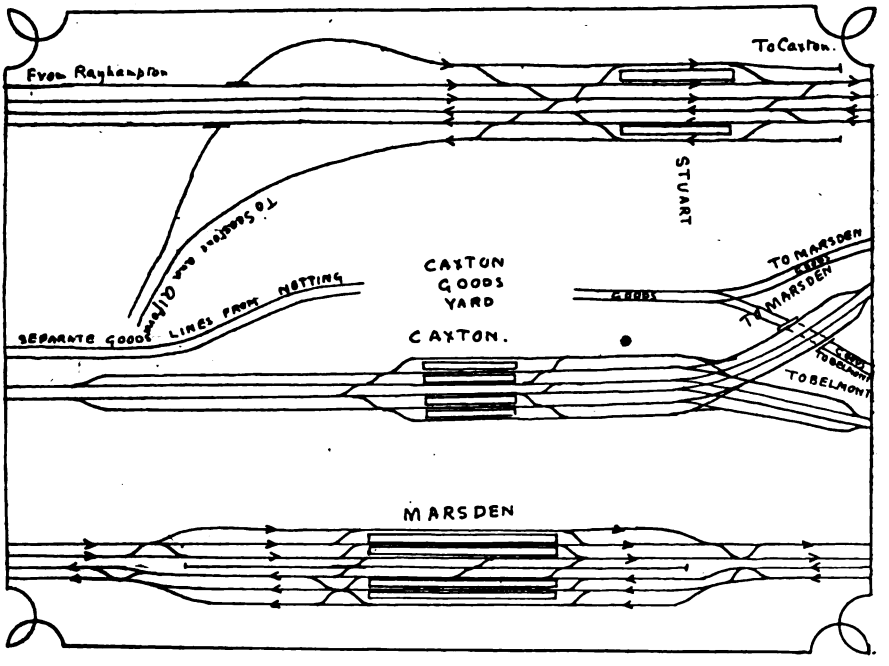


DIAGRAM VII. LAY-OUT AT STUART, CAXTON AND MARSDEN (NORTH SQUARE).

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Seastone line from the down side is continued on the low level until beyond the limits of the diagram, and a burrowing interchange is then made. Signalling also provides for the working of the length into Stuart station for either direction trains, to provide for the working of through special and goods trains from Stuart to Seastone.

At Caxton the goods lines and yard are quite independent, served by distinct lines from Notting, and extending for one station towards Marsden and towards Belmont. The connection to the latter route burrows under the Marsden main line. The passenger station has three lines for each direction, all with platforms of island type for convenient interchange. The approaches from each end are four-track for more than a train length, so that a train can always, if need arises, be held up before running to a platform on a line free of the through line; and sufficient connections are provided so that it is only down Belmont and up Marsden trains which need conflict.

From Tannington to Pensley (2½ miles) a down goods loop is provided; while for up trains there is one from Tannington to Stelford (2¾ miles). From Stalham to Kenton (Main) and on to Kenton (West) is four-track, with loop platforms at both stations; while at St. Luke, 3 miles from Marsden (North Square), four-track commences.

The station at Marsden has three long platforms for each direction, the outer ones being generally used for two local trains and the others for main line trains or as required. A centre line, with midway crossovers, facilitates the movements of locomotives attached to or detached from the Lowminster sections of expresses, for which reason these trains usually occupy the centre platforms in each direction, as a Lowminster engine can be easily worked from one side to the other. There are two spurs for lay-by coaches, and all six roads allow a train to be held up independently pending the clearing of a platform. At this station there are few terminating trains, the usual practice being to work locals in at one end from one route and out at the other for another route, although they may be classified publicly as distinct trains.

Remaining stations call for no special comment, most of them retaining the same features as in earlier days and being designed with platforms to suit the traffic. From Marsden (North Square) to Sandling is four-track and throughout the Marsden area there is an extensive mileage of separate goods lines. Goods traffic is worked away from the North Square station, and there are several flying junctions; but these and other features do not call for detailed attention. Belmont has five platforms, all used for arrival and departure as convenient. The loop from Arlingford to Cantwell is used mainly by goods trains, but occasionally by specials and in the height of the summer season by one through train to Elverton.

The Seastone branch calls for no detailed comment. Separate goods lines are provided from Seastone to beyond the junction with the Alford line. There are also, of course, extensive sidings and dock lines at Seastone.

*(To be continued.)*

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# British Railway Service and the War. [VII.]

A WELL-INFORMED contributor to the *Great Eastern Railway Magazine* has given some valuable details concerning the formation and duties of the various railway troops which are rendering inestimable services to the fighting forces. "Our Own Correspondent," as the writer prefers to be known, points out that the need for expert railwaymen for British military work followed upon the earliest movements, a thousand being required for repairs and maintenance work overseas in the first month of the war. The railways were called upon to furnish these, and quickly did so. The advance of the enemy in Belgium and France had the effect of destroying or dispersing the railway staffs in those districts. The English lines did what they could towards collecting the Belgian staff together, but it became necessary to furnish operating companies to deal with lines feeding the British fronts, in France and elsewhere.

The formation of the British railway operating troops from the railway staffs in this country began and has not yet ceased. The railway transport establishment also began to expand at a rapid rate. As soon as the need for this recruitment became evident the matter was energetically taken up by Sir William Forbes, General Manager, London, Brighton and South Coast Railway. He enlisted the first man and formed the first sections of the new companies. Lieut.-Colonel Commandant of the Engineering and Railway Staff Corps (an advisory body which has solved many similar problems), he has a keen personal interest in military as well as railway matters.

Mr. A. Watson, Superintendent of the Line, Lancashire and Yorkshire Railway, shortly afterwards undertook the enrolment of the Transport Corps (Royal Engineers) and Labour Troops (Army Service Corps), and also the Military Forwarding Establishment. Sir Francis Dent, General Manager, South Eastern and Chatham Railway, then took up the work connected with the Operating Corps. The task was by no means a simple one. Questions of pay, method of enrolment, qualifications of applicants, promotions, the difficulties of railway working, etc.; all the negotiations with the military and with the railway authorities, soon created a very large correspondence and involved interviews beyond number.

At first, to a certain extent, they worked separately forming the troops referred to; but, as the demand increased, closer co-ordination of the work became necessary, and they worked as a sub-committee of the Railway Executive, dealing with all questions concerning railway troops. Thousands of men have been transferred from the British railways to the military corps under their organisation, including staffs for railway store parks; inland water and canal troops; and they have now the responsibility for the maintenance and working of the whole of the camp railways in this country. A body of men has also been provided to deal with exceptional local strains arising through the creation of new munition works, on the lines adopted for the heavy work at the ports (Port and Transit Corps). The Railway Executive sub-committee has been increased to include the secretaries of the first three, Messrs. W. G. Pape (London, Brighton and South Coast), T. W. Royle (Lancashire and Yorkshire), W. R. Latta (South Eastern and Chatham).

The need to enlist railwaymen for these purposes implies that the recruit must be efficient in the particular railway work he is entered for. Care has been taken to secure efficient men, and there have been few cases of men being returned because they were not qualified to do the work. It was arranged that the enlistments should be made through the General Managers of the railways, who state the qualifications of the men put forward. A certain amount of adaptation has occurred: clerks have qualified for guards or checkers; men of lower grade have been tested and found suitable for a higher grade, thus fitters' mates have been taken as fitters; men of one trade have been able to do the work of an associate trade, *e.g.*, scaffold men have become riggers. This adaptation is, however, accomplished before the men are enlisted.

Men are trained and examined on the



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parent railways, or the enlisting officials (the sub-committee) have them tested on their own lines, and when they enter railway troops only need military training. After this training they may be returned for a period to civil employment, being then entitled to wear their uniform. A small number have been returned under this arrangement, but often their call for service overseas comes very quickly. The military authorities have on several occasions expressed their satisfaction with the quality of the recruitment. The majority of the officers for these troops have also been drawn from the British railways at home; others being highly trained men from British military or foreign railway enterprises.

Owing to their own difficulties the railways found it at times a hard task to provide the men required. At one time it appeared as if they could send no more men of certain grades. The first great rush of ordinary calls and enlistments, without any corresponding decrease of traffic, and without time to train new staff or make necessary adjustments, created a situation in which all officials were very loth to release men. This was not confined to one system but was a general state of things. In various ways already referred to the difficulties were got over; adjustments were made, the women, the retired men, and others filled the breach, and greater numbers began to be released for military railway and other services. Still, the demand for railway troops did not cease, and later the Railway Executive had to retain all railwaymen available for enlistment while the situation was reviewed.

The railways furnished details of the men that might still be spared, and the Sub-Committee, after going into the question exhaustively, stated the requirements and the numbers which might be released for ordinary military services. In the case of certain grades, of course, all those available for military service had to be retained for railway troops. There is little doubt that the demands have not reached finality, and when the home railways are exhausted the Sub-Committee will have to proceed to draw upon railwaymen of the required grades now serving in combatant corps.

In conclusion, the writer, whom we have pleasure in quoting, mentions that the railway troops are in a peculiar position, inasmuch as they are not actually of the regular or territorial forces. This is a disadvantage to the men, as they do not benefit from the numerous collections for comforts for the ordinary troops—no flag-day has been held on their behalf. Consequently, the Sub-Committee has been obliged to appeal to the railways for this purpose. About £6,000 has been collected during the war, largely from the exhibition of hospital trains at principal stations. Underclothing, pipes, footballs and other things to give comfort or wile away the hours have been sent to the different parts of the world where the men are serving—France, Salonika, Mesopotamia, Egypt, and other places. A small sum is yet in hand, but with the increasing numbers a good deal will have to be found to meet the exigencies ahead, especially if we war again in winter. It is for the railways —[and for those interested in railways. Ed. R.M.]—to find the necessary sums; it is their special concern to see that the lonely railway soldier does not want for the small things that mean so much but for which no army form is provided.

Writing in *The Railway News*, Lieut. Charles Travis, one of the band of Great Central Railway officers now serving in various capacities with His Majesty's Forces, and who is engaged on special duties at home for which his railway training specially fits him, describes the provision for soldiers and sailors passing through, at Perth station, Caledonian, Highland and North British Railways, with particular reference to the "Perthshire Patriotic Barrow." Perth claims the honour of first introducing this feature. To-day, after two years of devoted work, the "Barrow" helpers in the "Fair City" look back with pardonable pride to the birthday of the effort—Friday, August 7th, 1914. The story of those early days has been well told (in a pamphlet issued on behalf of the movement) by Miss Cowie—Joint Convener with Miss Drummond—of the "Barrow" Executive Committee. "Early in August," says Miss Cowie, "when thousands of boisterous recruits were sent hither and thither on the railways, and 'Tipperary' and its accompaniments brought acute dryness to young and lusty throats, our call to service came"

"We carried water to the locked-in enthusiasts, we stripped our own and our neighbours' fruit trees, supplied tea and whatever other thirst-quenchers our modest resources would permit. For weeks we served twos, and sevens and tens; and then, one memorable morning, we saw possibilities of fuller service for ourselves and others. Fifteen shivering men, wounded at Mons and

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*By courtesy*] [*Great Western Railway Magazine.*

A WAR-TIME RAILWAY STAFF.

Clerks in Great Western Railway Locomotive and Carriage Department (Mileage Office) at Swindon.

discharged from hospital to report to headquarters, claimed our sympathy. Immediately afterwards a crowd of naval men from a tragical 'Somewhere' joined the Highland train *en route* for their distant homes. We gave them whatever could be secured; and, when the train had departed, we began to think!"

"Next morning forty recruits from London, with frayed cuffs, empty pockets and high spirits, crowded round like bees and gratefully carried off our limited supply of apples, gingerbread, and other eatables. Our thoughts took shape. Very soon came a request from Lady Tullibardine for our attendance at a meeting of patriotic ladies of Perthshire—and therefrom the tide of refreshment affairs turned. . . . twenty ladies gave daily, hearty service . . . the station officials were full of kindness and helpfulness, but we were still unsatisfied."

"Stories of cold and hungry men waiting between 5 and 7 a.m. for a Highland train came to our ears. We had visions of tea being served to them by valiant citizens; and then, upon the mildest suggestion being offered in a schoolroom, the vision became a reality. Twelve schoolmasters offered their services; 'Greathearts' inside and outside the station removed our difficulties; and so, through winter, spring and summer months, the helper and the helped have been brought together."

"To-day 'The Barrow'—emblem of the movement—is quite a handsome vehicle, made and gifted by generous station friends. It traces its descent to a humbler vehicle, which, it has caustically been suggested, bore a distant resemblance to a perambulator. And one must not forget the 'fetch and carry' pre-barrow days. The service to-day is carried on by forty willing workers, with little intermission from 5 a.m. each day to 1 a.m. next morning, the work being undertaken by groups, each responsible for regular periods. One of the latest developments is the provision of a well-equipped rest and recreation-room (a waiting-room converted), open from 8 p.m. till 1 a.m. for the accommodation of soldiers and sailors waiting for the night trains."

"From 600 to 800 men are served daily. To the end of June, 1916, over a quarter of a million men have been entertained at Perth station. That total represents an average of more than 10,000 per month, and in July reached the grand total of 20,071, involving an expenditure of over £100."

"The cost of catering works out on an average at 1d. per man, and those who carry on the work are proud of the fact that kind friends have made it possible to provide

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refreshments free. For the enlightenment of those who wonder how the catering is performed at this low average figure, it should be added that the work is greatly helped by donations in kind. Towards the end of June last a garden fete held at Invermay in support of the funds of the Perthshire Patriotic Barrow was brilliantly successful. Lady Beatty, wife of Admiral Sir David Beatty, opened the fete, which was attended by 'all the county,' despite inclement weather. The fete resulted in the handsome sum of £450 being secured."

In conclusion, Lieut. Travis quotes Mr. J. Ross Smyth (joint hon. secretary of the Executive Committee), who emphasises that no account of the activities of those who push the Perthshire Patriotic Barrow would be complete unless it acknowledged the kind help rendered by the officials and servants of Perth General station, from the stationmaster, Mr. Hardman, to the humblest porter. The work has been approved and seconded in the most generous manner by the Joint Station Committee, of which Mr. A. E. Pullar is Chairman, and without whose support the "Barrow" might never have pursued its joyful path.

We regret to learn that Lieut.-Col. Francis B. Mildmay, M.P., a Director of the Great Western Railway, who has been acting as an interpreter with the British Expeditionary Force, has returned from France suffering from injuries caused by his horse rolling upon him.

Recently compiled statistics show that no fewer than 17,558 members of the Great Western Railway staff have joined the Colours. Of this number, 7,235 went from the Locomotive and Carriage Department, 3,273 from the Engineering Department, 2,838 from the Traffic Department, 2,389 from the Goods Department, and the remaining 1,823 from the other departments. In addition, 2,423 men still in the Company's service have been nominated for the Railway Operating Division and will be called up at a later date. The number of men already gone represents 22·6 per cent. of the total staff, and those waiting to be called up equal 3·1 per cent., the total being, therefore, 25·7 per cent. Subdividing the statistics broadly into the two classes relating, respectively, to the wages staff and salaried staff, the percentage of the former is 22·84 and of the latter 32·67.

To provide for the efficient carrying-on of the work of transportation a large number of men of military age, who otherwise would have voluntarily enlisted or have been called upon for military service, have been retained. These number upwards of 26,000, the figures for the principal departments being: Locomotive and Carriage Department, 9,754; Traffic Department, 9,296; Goods Department, 4,173; Engineering Department, 1,917. Although many men not eligible for military service have been employed to temporarily replace some of those who have joined the Colours, the Great Western's total staff is at present something like 10,000 less than it was prior to the war. The casualty lists have recorded 620 members of the staff as having lost their lives, 930 wounded, sick, and prisoners of war, and 79 missing.

Pte. F. Rabbits, who prior to his enlistment in the Dorset Regiment on September 7th, 1914, was employed as a packer in the Engineering Department, Great Western Railway, at Yeovil (Pin Mill), has been awarded the Distinguished Conduct Medal for maintaining rapid fire on the Germans during an attack, and also bringing in a wounded man under rifle fire. Lance-Corpl. W. S. Cox, clerk in the Traffic Department at Avonmouth Dock, Great Western Railway, and now serving with the Colours, has been mentioned in despatches for good work performed while attached to the Headquarters staff at Salonica. Corpl. E. J. Mattingly, of the General Manager's office, at Paddington, was mentioned in Sir Douglas Haig's despatch of April 30th, for distinguished conduct in the field. He has since been promoted to the rank of sergeant.

Several Great Central Railway items may be briefly referred to, in conjunction with a series of portraits for which we are indebted to our Great Central contemporary. Staff-Sergt. A. L. Binner, A.S.C. (Clerk, Frodingham), has been mentioned by Sir D. Haig for meritorious conduct in the field. A native of Barnsley, he began his railway career at Frodingham, August, 1899, under his brother-in-law, Mr. Wikeley (now of Ducie Street), where he remained up to the time of joining the Forces, passing through various departments in the Goods Office. When war broke out he was very anxious to go out with the local R.A.M.C., of which he had been a member several years, but on account of his height (he is only 5 ft. 2¼ in.) he was passed over, and this determined him to join the A.S.C. He was in training at various places in this country, and quickly rose to the rank of sergeant. He went out to France in the autumn of last year, and

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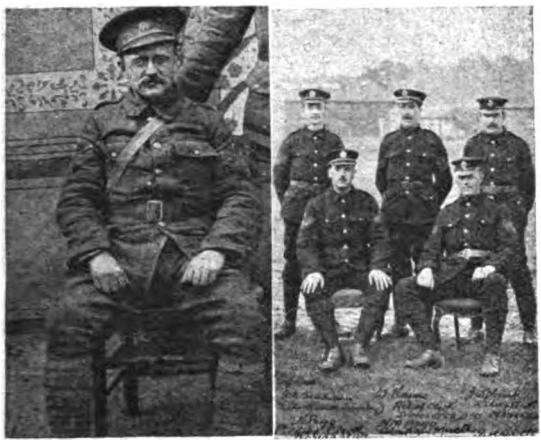

SOME GREAT CENTRAL RAILWAY STAFF.

S.-SERGT. A. L. BINNER (Clerk, Frodingham). SERGT. G. A. BEADMAN (Clerk, West Tinsley).
SERGT. W. RAINS (Relief Clerk, Doncaster).
SERGT. J. W. PLANT (Relief Clerk, Manchester).
SERGT. H. PEGG (Relief Clerk, Doncaster).
SERGT. H. M. PEGG (Stationmaster, Gwersylt).

since being there has been promoted to staff-sergeant.

Sergt. W. J. Hill, Railway Troops (formerly a ganger at Neasden), has received mention in despatches for excellent work laying in trench tramways during the latter part of August, and during September, October and November, 1915. It was chiefly due to this N.C.O.'s initiative and example that the work was carried out so expeditiously. Part of the work was put in under particularly trying circumstances, especially during the last fortnight of September, 1915. Lance-Corpl. J. Coates, Leicester Regt. (Police Constable, Grimsby Docks), has received a commendation signed by Major-General C. Ross, dated July 11th, 1916, in the following terms: "Your Commanding Officer and Brigade Commander have informed me that you distinguished yourself at Rue-de-Bois on many occasions, between January 20th and April 30th, 1915, placing obstacles in different positions under fire. I have read their report with much pleasure." Lance-Corpl. Coats was, prior to rejoining the Army, a constable at Grimsby Docks, and has since the Commendation been promoted to corporal.

The London and South Western Railway has lost by the fortunes of war many members of the staff known locally, if not generally, and among them are Mr. S. C. Stephens and Mr. H. P. Kennett. Mr. Stephens—a portrait is reproduced by courtesy of our London and South Western contemporary—was for several years Secretary of the London and South Western Rifle Club. Mr. Stephens entered the Company's service in 1901, and was for nine years in the General Manager's Office, which position he resigned to take up an appointment in the City. Apart from his work in connection with the Rifle Club, he was also assistant to the Hon. Centre Secretary of the St. John Ambulance Association.

Soon after the outbreak of war he voluntarily enlisted as a private in the Royal Fusiliers, and his death in action in France is deeply regretted by all of his numerous friends connected with the Rifle Club at Waterloo.

Official notification has also been received of the death of Mr. H. P. Kennett, who, previous to joining the Colours in September, 1914, was attached to the Clerical Staff of the Central District Traffic Superintendent's Office at Southampton West. He died in Mesopotamia "from disease" on July 25th. Mr. Kennett, or "Hadge," as he was popularly called, was a keen sportsman and acted as Secretary to the C.D.S.O. Cricket and Football Clubs, in addition to taking a prominent part in their field engagements.

SOME GREAT CENTRAL RAILWAY STAFF.

SAPPERS J. WITTY (Grimsby Docks).
G. T. VINCENT (Signalman, Stairfoot).
S. W. LEONARD (Porter, Birdwell).
L.-CORPL. W. GREENFIELD Leicester Regt. (Shunter, Worksop).

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PRIVATE S. C. STEPHENS.

For several years Secretary of the London and South Western Railway Rifle Club.

He was one ot the first to volunteer on the outbreak of hostilities, and sailed for India a month afterwards, from whence he was transferred to Mesopotamia in July, 1915.

Sergt.-Major W. T. Storrie, who, from 1901 to 1910, was employed as clerk in the Divisional Superintendent's Office, North Eastern Railway, Newcastle, and afterwards transferred to the Leeds Divisional Superintendent's Office, was mentioned in General Sir Douglas Haig's despatch dated April 30th for gallant and distinguished conduct on the field. Previous to the outbreak of war he was sergeant in the Northumberland Artillery (T.). That there are still chances for rapid promotion in the British Army is evident from the career of Temporary Capt. W. E. Pogson, who, a little more than a year ago, was employed at Leeds, as private clerk to Mr. Noble, District Superintendent, North Eastern Railway. Joining the Leeds University O.T.C., in June, 1915, Capt. Pogson received, in November, a commission of 2nd Lieut. in the K.O.Y.L.I. He gained a special certificate in signalling at the Northern Command School at Otley on December 18th, and was appointed Signalling Officer to an Infantry Brigade on December 21st. On March 6th, 1916, he was appointed Acting-Capt., though not yet 19 years of age, and at the time of writing he is still the Signalling Officer to the Brigade. Mr. Arthur Seymour, who for seven years previous to April 28th, 1915, when he joined the Inns of Court Officers' Training Corps, had been employed in the Outdoor Department of the General Superintendent's Office, York, North Eastern Railway, has been granted a commission as 2nd Lieut. in the West Yorkshire Regiment (T.F.).

Pte. Laurence B. Mills, of the King's Liverpool Regiment, has gained the French Croix de la Guerre for meritorious service during the war. Prior to enlisting he was employed for four years in the catering department of the Midland Railway, and in that capacity went to Paris for improvement. There he acquired a knowledge of the French language, and was employed during the recent advance in conveying messages and despatches between the English and French lines. While so engaged he was seriously wounded. Lance-Corpl. A. Smith, of the Royal Fusiliers, another Midland man, has made the supreme sacrifice. He fell in the great offensive on July 27th. He was for eight years in the secretarial department of the Midland Railway, and was afterwards pay clerk at Messrs. Vickers, Maxim and Co.'s works at Deptford.

Cadet Robert Frearson Domleo, of the Royal Fusiliers, has been gazetted a 2nd Lieut. in the Notts. and Derby Regiment. Formerly a scholar of Derby School, he afterwards passed through the Midland Railway locomotive works. Sergt. H. Wren, of the Mounted Military Police, attached to Divisional headquarters in France, has been awarded the Military Medal for conspicuous gallantry. He was formerly employed at the Midland Railway works at Derby. Cadet Harry Moore, of the cashier's office, secretary's department, Midland Railway, Derby, has been gazetted temporary 2nd Lieut. in the Notts. and Derbyshire Regiment.

Lance-Corpl. R. P. Carr, Royal Fusiliers, has fallen in action. He was in the trenches for five months last year, and was again sent to the Front about six weeks ago. His

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captain, in a feeling letter conveying the sad news to his parents, wrote that the deceased had proved to be one of the most valuable men in the battalion, and the officers, N.C.O.'s and men offered their deepest sympathy. Lance-Corpl. Carr was the son of Mr. R. H. Carr, Chief Claims Clerk, Goods Manager's Office, Midland Railway, Derby, and joined the Fusiliers with his brother, Mr. F. H. Carr, in September, 1914, both prior to enlistment occupying positions in the same railway department. He was 27 years of age.

Police-constable J. E. Curtis, of the Midland Railway Police, Heysham, second-class petty officer, R.N., has been awarded by H.I.M. the Czar, the Russian Medal of the Order of St. Anne for zeal whilst serving with the British Naval Forces in the White Sea during the winter of 1914. Curtis, who had previously served in the Royal Navy from January, 1897, to September, 1911, and already held the China Medal and Clasp, entered the Midland Railway service in January, 1912, and was called up with the reservists on the mobilisation of the Forces.

Lieut. E. R. Allen, R.E., who has been awarded the Military Cross, was at one time with the Canadian Northern Railway, engaged in construction work in the Sudbury district. Lance-Corpl. George T. Boyd, who has been awarded the Military Medal for devotion to duty on the field, is a native of Castlefin, County Donegal. Before the war he was in the service of the Canadian Northern Railway. He enlisted on the outbreak of war and was wounded in May, 1915.

Capt. Montague W. Brown, R.E., Assistant Rolling Stock Superintendent, Crewe, has been mentioned in Sir Douglas Haig's despatch, for services rendered with the British Expeditionary Force. From July 12th, 1916, he has been promoted to Deputy Assistant Director, Railway Transport.

A fine poster has been issued by the Lancashire and Yorkshire Railway giving particulars of distinctions gained by employés during the European War. The following are the details therein given :

W. Cawson, Private (Chief Goods Manager's Department, Goole). Died of wounds, May 15th, 1915. (Awarded V.C. posthumously). Although seriously wounded, held trench for eight hours.

F. J. Powell, Captain and Flight Commander, R.F.C. (Chief Goods Manager's Department, St. Anne's). Awarded Military Cross for distinguished service in the field.

E. C. Simpson, Captain, Military Forwarding Officer (Assistant, Antwerp Agency). Awarded Military Cross in recognition of special services rendered in connection with the Military Forwarding Establishment in France.

T. C. Simpson, 2nd Lieutenant, Royal Engineers, T.F. (Chief Civil Engineer's Department, Manchester). Awarded Military Cross.

J. Barker, Private, East Lancashire Regiment (Chief Civil Engineer's Department, Blackburn). Awarded Distinguished Conduct Medal for conspicuous gallantry, ability, and general good work on numerous occasions, especially at Le Gheer on January 17th, 1915, in voluntarily assisting another man in extinguishing a fire caused by German shells. This work was accomplished under heavy rifle, machine-gun, and shell fire. He was previously employed in erecting wire entanglement every evening, 80 yards from the enemy.

C. Brownlow, Corporal, 1st East Yorkshire Regiment (Chief Goods Manager's Department, Leeds). Awarded Distinguished Conduct Medal for gallantry in the field.

R. Casey, Private, Lancashire Fusiliers (Chief Goods Manager's Department, Radcliffe). Awarded Distinguished Conduct Medal for conspicuous gallantry on June 4th, 1915, during an action south of Krithia, Gallipoli Peninsula.

W. H. Clapp, Able Seaman, Royal Navy (Chief Goods Manager's Department, Rochdale). Awarded Distinguished Service Medal for gallantry in connection with the evacuation of the Gallipoli Peninsula.

J. W. Cooper, Private, West Yorkshire, T.F. (Chief Goods Manager's Department, Leeds). Awarded Military Medal for distinguished service in the field.

H. Dixon, Corporal, Manchester Regiment (Department of the Superintendent of the Line, Mles Platting). Awarded Distinguished Conduct Medal for conspicuous gallantry in assisting an officer to carry, under heavy shell fire, a badly wounded man to a place of safety. On another occasion he again assisted to carry wounded men, under heavy fire, from a listening post back to the fire trench.

T. J. Edwards, Company Sergt.-Major, Loyal North Lancashire Regiment, T.F. (Chief Mechanical Engineer's Department, Horwich Works). Awarded Distinguished Conduct Medal for conspicuous gallantry in action. Although wounded, he successfully rallied and led his company on

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to the assault after his officers had become casualties. On another occasion his fine example during a heavy bombardment gave great confidence to his company.

T. Hayes, Private, Yorkshire Regiment (Carriage and Wagon Department, Sowerby Bridge). Awarded Distinguished Conduct Medal for gallant conduct on many occasions in conveying messages whilst exposed to heavy fire.

E. Harling, Bombardier, Royal Field Artillery (Chief Goods Manager's Department, Burnley). Awarded Military Medal. Also awarded Distinguished Conduct Medal, June 4th, 1916, for repairing communication wires destroyed by enemy shell fire.

C. S. Hinsley, Driver, R.F.A., T.F. (Department of the Superintendent of the Line, Knottingley). Awarded Military Medal.

J. Howarth, Sergeant, Manchester Regiment (Carriage and Wagon Department, Newton Heath). Awarded Military Medal.

A. Marshall, Private, Cheshire Regiment (Carriage and Wagon Department, Sowerby Bridge). Awarded Distinguished Conduct Medal.

H. L. Sheard, Lance-Corporal, Duke of Wellington's Regiment (Chief Civil Engineer's Department, Mirfield). Awarded Distinguished Conduct Medal for consistent good work throughout the campaign, notably on the Yser Canal, on November 17th, 1915, when he attended to a wounded man under heavy rifle and machine-gun fire, and although wounded himself he refused to leave his wounded comrade until he was satisfied no more could be done for him.

G. E. Stockham, Private, R.N.A. Sick Berth Reserve, Carriage and Wagon Department, Bolton). Awarded Distinguished Service Medal in recognition of his services with the Mediterranean Expeditionary Force. (Private Stockham unfortunately died of wounds received in the Dardanelles).

E. Walch, Staff-Sergeant, R.N.A. Sick Berth Reserve (Chief Goods Manager's Department, Bolton). Awarded Distinguished Service Medal for conspicuous services whilst in command of the Ambulance Section of the Naval Brigade during the bombardment of Antwerp.

T. D. Withers, Company Quartermaster-Sergeant, King's Own Royal Lancaster Regiment (Chief Civil Engineer's Department, Fleetwood). Awarded Distinguished Conduct Medal for conspicuous gallantry during operations. He brought up supplies to the firing line under very heavy shell fire.

In addition, a new table is given of the number of men from each department serving with His Majesty's Forces to July 27th, 1916, with the percentages of total staffs represented. These particulars are as follows :

| | Total. | Percent'ge |
|---|---|---|
| Chief Goods Manager's Department .. .. | 2,012 | 20·27 |
| Department of Superintendent of the Line .. | 1,202 | 14·08 |
| Chief Civil Engineer's Department .. .. | 641 | 14·66 |
| Chief Mechanical Engineer's Department— | | |
| Locomotive .. .. | 2,051 | 19·36 |
| Carriage and Wagon | 603 | 19·58 |
| Other Departments .. | 508 | 39·72 |
| Total .. .. | 7,017 | 18·56 |

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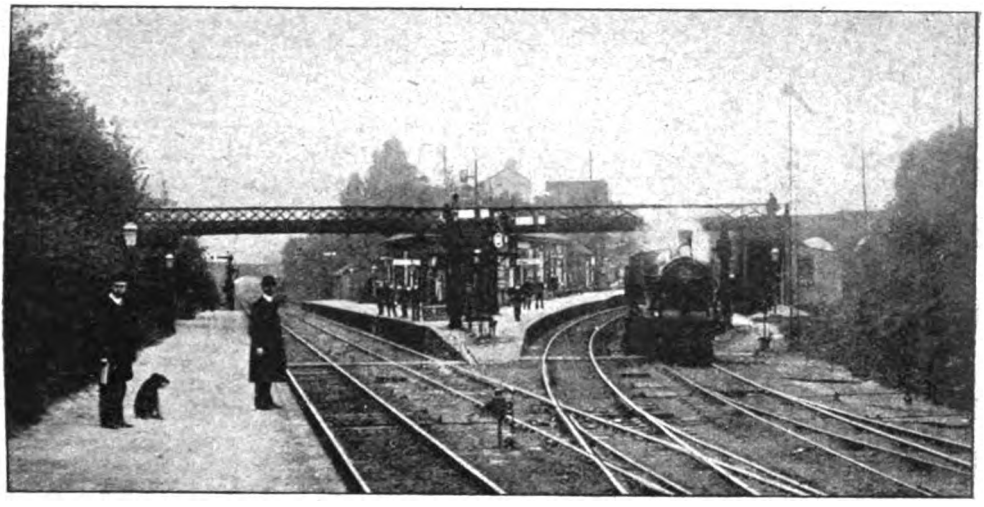

SWANLEY JUNCTION.

# The London, Chatham & Dover Railway: An Historical Sketch, 1853–1898. [No. I.]

By H. L. HOPWOOD.

AT the time of its fusion with the South Eastern Railway, on January 1st, 1899, the London, Chatham and Dover Railway comprised a system 198 miles in length. Its main line extended from Victoria station, London, through Chatham, Faversham and Canterbury, to Dover, a distance of 78½ miles. The two most important branches were the Kent Coast line from Faversham to Ramsgate Harbour, and that from Swanley Junction to Ashford, *viâ* Maidstone. Omitting for the present the various lines in the London area, there were also the following short branches: Fawkham Junction to Gravesend (West Street); Strood Junction to Strood (South Eastern station); Sittingbourne to Sheerness-on-Sea; Otford to Sevenoaks (Tubs Hill station); New Brompton to Chatham Dockyard and Faversham to Faversham Quay: the two last mentioned lines being used for goods traffic only. Finally there was the Dover and Deal line, the joint property of the London, Chatham and Dover and South Eastern Railways.

The history of the London, Chatham and Dover Railway starts in 1853, when on August 4th of that year the East Kent Railway received its Act of Incorporation. This Act authorised the construction of a line in continuation of the North Kent branch of the South Eastern Railway, from Strood to Canterbury, with branches to Faversham Quay and Chilham. The projected line to Chilham, however, was never made. By further Acts, dated July 16th, 1855, and July 23rd, 1858, the Company was empowered to make eastward and westward extensions respectively, viz., from Canterbury to Dover, and from Strood to St. Mary Cray. The line was opened between Strood and Faversham, February 25th, 1858, the branch to Faversham Quay April 12th, 1860, and the remaining portion as far as Canterbury, July 18th, 1860. The extension of the railway to Dover was completed July 22nd, 1861, and the Westward Extension from Strood to St. Mary Cray, October 12th of the same year. In the meantime—by Act of August 1st, 1859—the title "East Kent Railway" was changed to that of the "London, Chatham and Dover Railway."

Near to St. Mary Cray the Western Extension formed an end-on junction with the Mid-Kent (Bromley to St. Mary Cray) Railway which had been authorised on July 21st, 1856, and opened for traffic July 5th,



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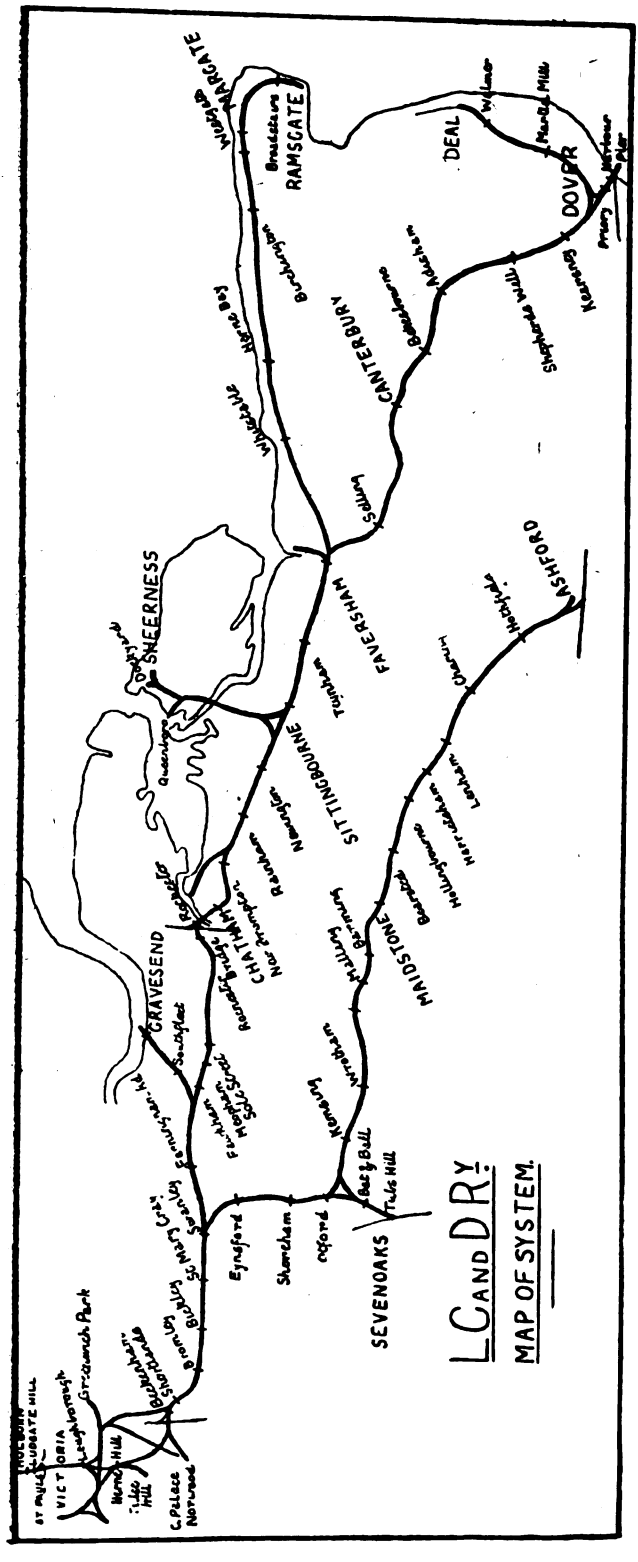


1858. About this time a line of railway known as the Farnborough Extension of the West End and Crystal Palace Railway was in existence or under construction between the London, Brighton and South Coast Railway at Norwood Junction and Bromley, and by Act of July 23rd, 1860, the undertaking was transferred to the London, Chatham and Dover Railway, and an extension of time to August 8th, 1862, granted, but the construction of the line between Bromley and Farnborough was not proceeded with.

Since its opening, January 1st, 1857, the South Eastern Railway had been working the Mid-Kent Railway proper (Lewisham to Beckenham,) and when the Bromley to St. Mary Cray Railway was ready they also undertook the working of that line by providing a service of trains from Lewisham to Bickley. On September 1st, 1863, the London, Chatham and Dover Railway obtained a 999 years' lease of the Mid-Kent (Bromley to St. Mary Cray) Railway, and some years afterwards the South Eastern Railway withdrew their service over the line, the trains from Lewisham then terminating at Beckenham Junction.

In order to reach London, the London, Chatham and Dover Railway, from November 1st, 1861, exercised running powers over the West End and Crystal Palace Railway to Battersea, and then over the Victoria Station and Pimlico Railway into a temporary station at Victoria.

The Sittingbourne and Sheerness Railway was incorporated as a separate Company on July 7th, 1856, and the line was opened between those towns, July 19th, 1860. On July 19th, 1865, the undertaking was purchased by the London, Chatham and Dover Railway, who in 1876 opened the branch to Queenborough Pier, and on June 1st, 1883, the extension

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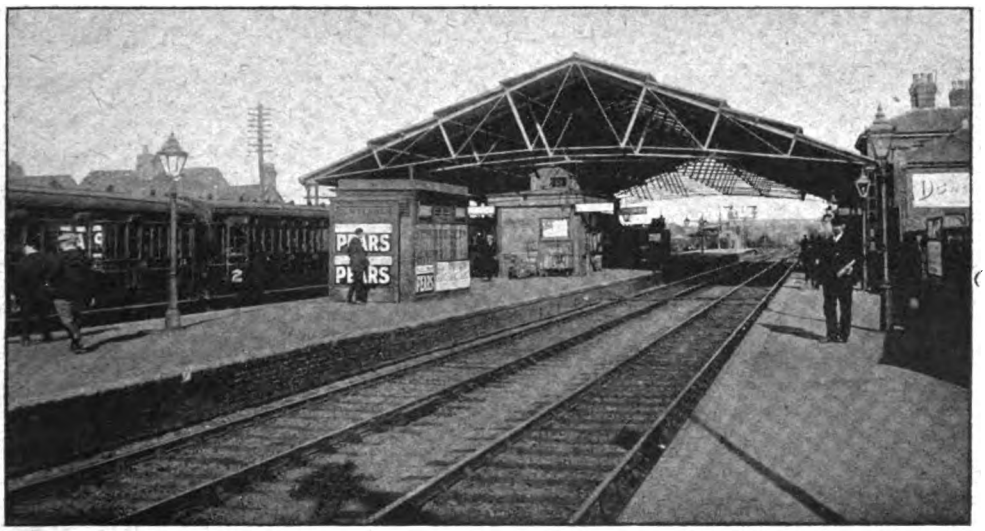
from Sheerness Dockyard to Sheerness-on-Sea.

Incorporated August 17th, 1857, to construct a line from Faversham to Herne Bay, the Kent Coast Railway was opened as far as Whitstable, August 1st, 1860, and to Herne Bay, July 13th, 1861. Subsequent Acts authorised extensions to Margate and Ramsgate, and the line was completed to the latter town, October 5th, 1863. The Kent Coast Railway was formally amalgamated with the London, Chatham and Dover Railway as from July 31st, 1871.

Originally promoted by an independent Company called the Sevenoaks Railway, the branch from Swanley to Ashford was opened to Sevenoaks (Bat and Ball station), June 2nd, 1862, the short connection to the Tubs Hill station of the South Eastern Railway following in 1869. In the meantime the Sevenoaks Company had obtained powers to carry the line on to Maidstone and Tonbridge, and it was constructed and opened as far as Maidstone on June 1st, 1874. This independent Company was absorbed on June 30th, 1879, by the London, Chatham and Dover Railway, who abandoned the Tonbridge project, and constructed instead, an extension from Maidstone to Ashford, this section being opened July 1st, 1884. The loop at Otford had been opened in 1880, but the short connection between the London, Chatham and Dover and South Eastern Railways at Ashford was of more recent construction, dating from 1892.

On February 16th, 1877, the Chatham Dockyard line was opened. This branch, which is used for goods traffic, joins the main line east of New Brompton station.

By Act of June 30th, 1874, the Dover and Deal line was authorised. It was constructed jointly by the London, Chatham and Dover and South Eastern Railways, and was opened June 15th, 1881. An additional spur, known as the Kearsney Loop line, to join the London, Chatham and Dover main line at Kearsney, was brought into use July 1st, 1882. The Gravesend branch, which leaves the main line at Fawkham Junction, was opened, together with the Pier on the Thames, May 10th, 1886.




SITTINGBOURNE STATION.

It will be remembered that the London, Chatham and Dover Railway had gained access to London in 1861, but this was by means of running powers over foreign railways, and involved a somewhat roundabout journey. The arrangement was only a temporary one, and the Company was already—by Act of August 6th, 1860—empowered to make a line of their own into London, with several branches. These lines were opened at various dates between 1862 and 1866, and comprised the following:—(1) From near Beckenham (Penge Junction) to Herne Hill, continuing thence through Blackfriars and across the Thames to a junction with the Metropolitan Railway at Farringdon Street; (2) From Herne Hill to Battersea, there to join the Victoria Station and Pimlico Railway, with running powers

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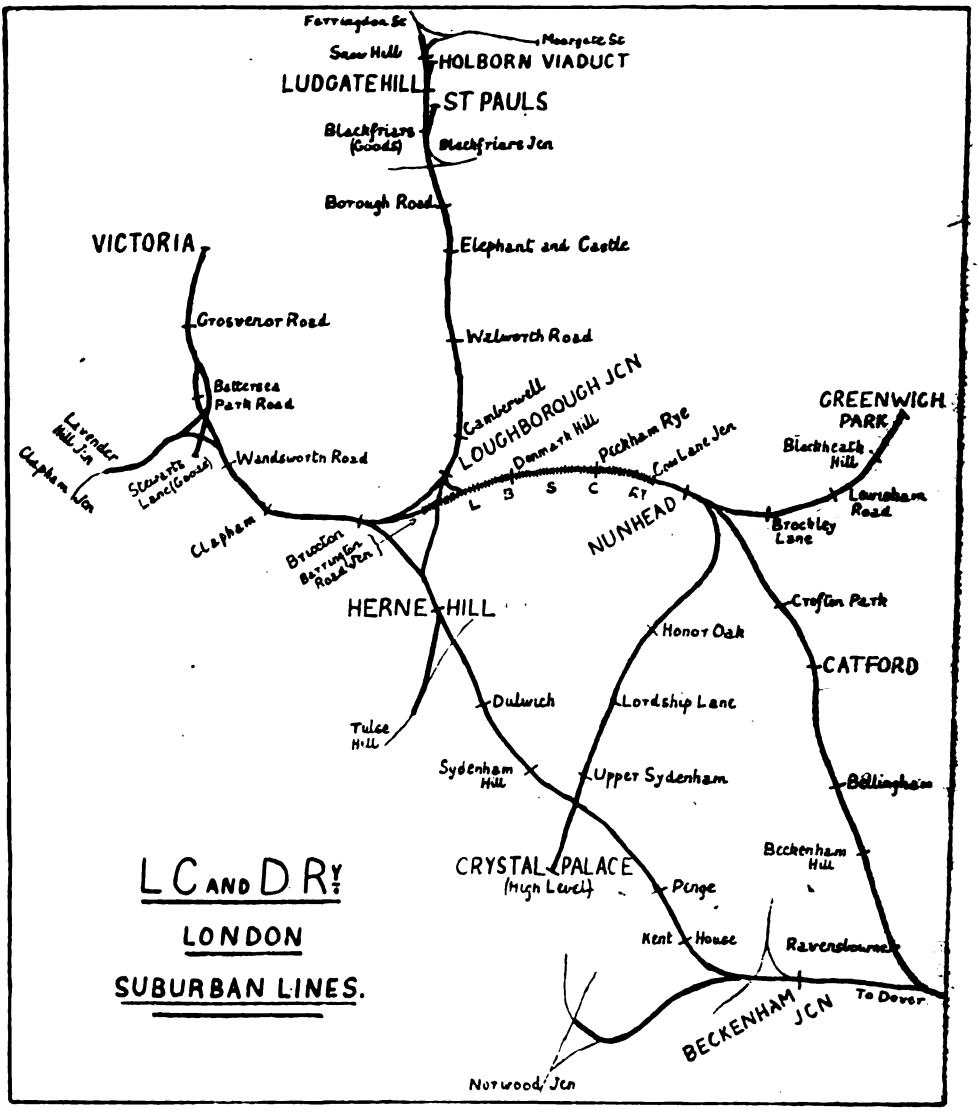
over the latter into Victoria; and (3) a connection to the London and South Western Railway near Clapham Junction, and a loop line between Brixton and Loughborough. Another short line—that from Herne Hill to connect with the London, Brighton and South Coast Railway at Tulse Hill—was opened in 1869.




There were at this time three principal stations in London, viz.: Victoria in the West End, Ludgate Hill in the City, and Blackfriars on the south side of the Thames. Up to 1862 temporary accommodation had been provided at Victoria, but in that year the present station was opened, and in 1866 a short line was constructed over the Thames to a point known as Battersea Pier Junction. This involved the widening of the river bridge which already existed, and the cost was borne jointly by the London, Chatham and Dover and London, Brighton and South Coast Railways.

Holborn Viaduct station was opened on March 2nd, 1874, and St. Paul's station on May 10th, 1886. In the latter year Herne Hill station was enlarged and the line from there into London widened, this work necessitating the widening of the original

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Blackfriars bridge over the Thames. Shortly before St. Paul's was opened, Blackfriars was closed for passenger traffic and has since been used as a goods depôt.

The Crystal Palace and South London Junction Railway was incorporated as a separate undertaking on July 17th, 1862, and was opened August 1st, 1865. The line extended from the High Level station at the Crystal Palace to an end-on junction with the London, Brighton and South Coast Railway at Cow Lane, near Peckham Rye. From the latter point to Barrington Road Junction, Brixton, running powers were exercised over the London, Brighton and South Coast Railway. In 1871 a short connecting line was made from Cambria Road Junction to Loughborough, which enabled trains to run direct between the City and the Crystal Palace. Previous to this date Crystal Palace trains only ran to and from Victoria, City passengers changing at Brixton. The Crystal Palace and South London Junction Railway was purchased by the London, Chatham and Dover Railway on July 1st, 1875. The branch line from Nunhead to Greenwich Park was opened as far as Blackheath Hill in 1871, and completed to Greenwich Park on October 1st, 1888.

Opened for traffic July 1st, 1892, the Nunhead and Shortlands, or Catford Loop Line, was the last of the numerous lines made by the London, Chatham and Dover Railway, except the widening to four tracks of the main line between Shortlands and Bickley, which was brought into use on May 1st, 1894. Four tracks had also existed on the main line between Kent House "A" Box and Penge Junction for some time previous to this date.

The London suburban traffic was an item of considerable importance to the London, Chatham and Dover Railway, a large proportion of their revenue being derived from it. In order to develop this traffic, there was inaugurated as early as March 1st, 1868, a through service of trains between Victoria and Great Northern suburban stations, *viâ* Snow Hill and Farringdon Street. On September 1st, 1871, London, Chatham and Dover trains commenced running into Moorgate Street, and from July 1st, 1875, through trains were also run to and from Victoria and Midland stations as far as Hendon. The Great Northern service was withdrawn September 30th, 1907, and the Midland service June 30th, 1908.

The most important engineering works on the London, Chatham and Dover Railway are found in the neighbourhood of London. The Metropolitan Extension was a very costly undertaking, and involved, among other works, the tunnelling of Sydenham Hill. This tunnel, 1 mile 44 yards in length, is the second longest tunnel on the system. In approaching London the line for the most part had to be made above ground level, and was carried on no fewer than 742 brick arches and 94 girder bridges, extending for 5¾ miles. In order to obtain access to the terminal stations, two large bridges over the Thames were constructed, that at Blackfriars measuring 933 ft., whilst the Battersea Bridge was 740 ft. long. Another notable bridge is that over the Medway at Strood, 510 ft. long. The longest tunnel on the London, Chatham and Dover Railway is situated at Shepherds Well, near Dover, this being 1 mile 616 yards in length.

Exceptionally severe are the gradients; in fact, the London, Chatham and Dover Railway possesses a more difficult road than any railway running out of London, the ruling gradient being 1 in 100. From London to Sole Street, a distance of 27 miles, the line rises and falls continuously, frequently at 1 in 100, and from Sole Street it falls for 6 miles at the same inclination to Strood. From there to Faversham, 19 miles, the gradients are easier, but from Faversham to past Selling the line rises at 1 in 110 and 1 in 100 and then falls at 1 in 132 to Canterbury, 10 miles from Faversham. Again from Canterbury to Shepherds Well it continues to rise for 10 miles, after which it falls sharply to Dover, first at 1 in 132 and then at 1 in 105.

The Kent Coast line is practically level as far as Herne Bay, but after that station is passed there is a sharp ascent and descent, both at 1 in 100. Approaching Birchington there is another similar rise, and from Margate the line ascends at 1 in 132 and 110 to Broadstairs, and then falls at 1 in 120, followed by a steeper fall at 1 in 75 for 1½ miles to the terminus at Ramsgate Harbour.

On the Ashford branch the line rises and falls between Swanley and Otford, mostly at 1 in 101½. Just past Sevenoaks there is a rise at 1 in 82 and 105½ to Kemsing, after which the line falls at 1 in 101½, 200, 220, 132 and 101½ to Malling, 9½ miles from Sevenoaks. There is nothing very severe on to Maidstone except a descent at 1 in 165 and 101½ approaching that station, but beyond Maidstone the course is more severe, there being ascents for 9 miles at 1 in 110, 80, 100 and 264 to Lenham, where the

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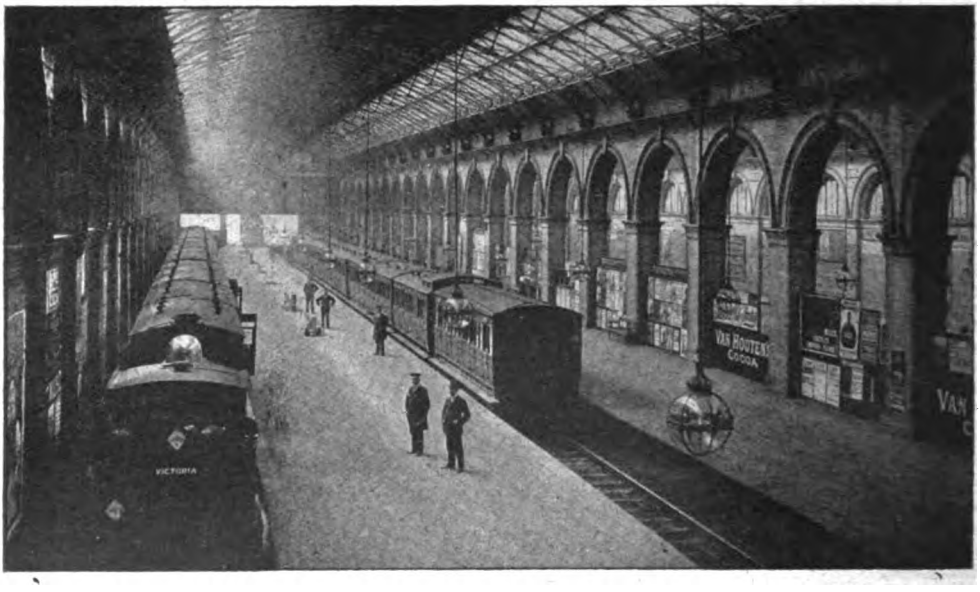
highest point of the whole system is reached. For the next 9½ miles to Ashford the line descends more easily, although grades of 1 in 100 are frequently met with. Coming out of Dover on the Dover and Deal joint line, there is an ascent for 2¼ miles at 1 in 70, and a descent for 3 miles at gradients varying from 1 in 64 to 1 in 72. In the London district there is a steep descent at 1 in 39 from Ludgate Hill to Snow Hill, in order to reach the lower level of the Metropolitan Railway. On the Crystal Palace branch there are four miles ascending at 1 in 78.




HIGH LEVEL STATION, CRYSTAL PALACE.

The London, Chatham and Dover Railway being one of the Southern lines, has in the past received its full share of inconsiderate public abuse. The chief causes of complaint were inferior accommodation at stations and in the matter of rolling stock, and the slow speed of the trains. Whilst many of these accusations were unmerited, certainly some of the older stations, and especially those in the London district, were not up to the usual standard of British railways, but from its earliest days the London, Chatham and Dover Railway had continually laboured under severe financial difficulties, and there is abundant evidence to show that, had the Company been in a better position financially, things would have been very different. On the other hand, the more modern stations were quite equal in quality to those found on the Northern lines, *e.g.*, Shortlands, Bromley, Bickley, Otford, Gravesend, Faversham, etc. And whilst many of the older carriages lacked passenger comfort, some very good and up-to-date bogie vehicles had been placed on the line latterly.

As to the alleged slowness of the trains, when the difficulties of gradients are considered, the train speeds were by no means bad. Some twenty years ago Mr. Pearson Pattison published a review of this railway and dealt at some length with the subject of train speeds, and the London, Chatham and Dover Railway holds a higher place than is generally thought to have been the case.

With regard to signalling equipment, the Company was always to the fore. It was the first railway to adopt the Sykes' Lock and Block system, which was gradually fitted throughout the line.

*(To be continued.)*

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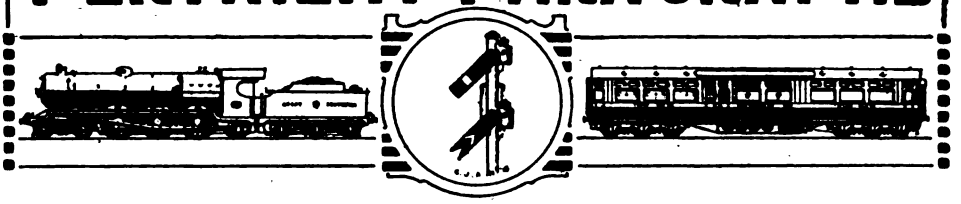
# PERTINENT PARAGRAPHS



### The "Railway Magazine" as a War-Time Publication.

It is not usual for us to reproduce congratulatory letters received from readers, though our correspondence includes many which might be so quoted, coming, too, from all parts of the world, and with a considerable number whose writers are serving with His Majesty's Forces on sea and land. It is, however, very pleasing to us to receive letters indicating that our efforts to produce issues of the Railway Magazine which not only maintain quality and interest of subject matter, notwithstanding the high cost of paper, printing and the difficulties of "carrying on," but also take due account of the special services which our railways and railwaymen are rendering in national interests, meet with appreciation, and it is clear from many of the letters which reach these offices that such expressions of appreciation are not mere formulæ. It has been our endeavour, during the eventful two years and more which have passed, to aim at a high standard of subject-matter and illustrations.

Our pages have not catered directly for special war-time interest. But due attention has been given to the various developments of the period affecting railways, and in most issues references have been made to the *personnel* of our railways in regard to war service. Otherwise subject-matter has been mainly of the instructive and informative character associated with the Railway Magazine, and it is with pleasure that we acknowledge the many indications of general approval which come to hand, from readers on active service as well as those still engaged in civil occupations at home and abroad.

We may mention that our well-known photographer, Mr. F. E. Mackay, is now engaged in army duties, in which connection we may express the good wishes both of the executive of the Railway Magazine and of the thousands of regular readers to whom his excellent and so far unequalled photographs of railway trains in motion have appealed for so many years.

### Educational Books for British Prisoners of War.

Many soldiers now prisoners of war in Germany were, in private life, in course of training for a subsequent career, and now that the fortunes of war have removed them from the fighting forces they are desirous of continuing their studies. Arrangements have therefore been made for sending technical books to them, and the following particulars as to regulations and the methods of despatch will no doubt be useful to readers who can help in this good work. Friends of any prisoner who wishes for educational books should note—

(*a*) Books (educational, not fiction) of their own providing will be sent to him, free, if forwarded to Mr. A. T. Davies, as noted below. The parcel must be carriage paid to London, be marked "Special" on the outside, and contain the prisoner's name and address, also the sender's.

(*b*) If it is known what kind of books the prisoner wants, but it be desired that they should be provided for him under the scheme, then send Mr. A. T. Davies a postcard, head it "2nd communication," and ask that a "Request Form" be sent to you.

(*c*) If it is merely known that a prisoner wants books to study, but not what kind he needs, your request should be that a form be sent to him direct. Be sure to give his correct name and address.

Persons willing to contribute books to the scheme should first submit a list of them with their name and address written at top. They will then be notified which books will be acceptable and these should be forwarded along with the marked list. Donors who do not see their way also to bear the cost of carriage of the books to London may send their parcel by rail marked "Carriage forward." No books should be sent unless previously accepted.

Contributions towards the working of the Scheme (which is entirely dependent upon voluntary contributions and worked by voluntary labour) will be very welcome, and if sent as directed will be duly acknowledged. Circulars and Forms explanatory of the working of the scheme will be sent to (A) any intending donor of books or of money, or to (B) a teacher of a Camp education class, or to (C) a prisoner of war, on receipt, in each case, of the requisite name and address. Please state when writing whether Circular (A) or (B), or Form (C) is desired. (B) and (C) can only be sent abroad by Mr. A. T. Davies; being "printed matter" they cannot be sent by private individuals, who, however, in their letters, can tell prisoners about the scheme and urge them to apply for a form.

Parcels and letters should be addressed:—A. T. Davies, Esq., Board of Education, Whitehall, London, S.W., and the words "Prisoners of War" written in the left-hand corner.



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### Unusual Features of War-Time Traffic Working.

INFORMATION continues to come to hand concerning unusual features of war time traffic working. Mr. Norman H. Bayley, now with the British Expeditionary Force in France, mentions that he has noted Great Eastern Railway goods engines between Eastleigh and Winchester, and London and South Western and South Eastern and Chatham goods engines near Didcot, Great Western Railway.

Another reader, Mr. Harold R. H. Ward, states that at Euston station recently a train arriving from the north had six brake vans in front, of which five belonged to other companies, two Highland, two East Coast Joint Stock and one Great Northern. There was also an old Great Western Railway clerestory roof coach in the middle of the train. He also mentions seeing two troop trains proceeding down the Midland main line drawn respectively by London and South Western 4–4–0 engines Nos. 292 and 712.

Referring further to traffic working curiosities on the Midland and South Western Junction Railway, Mr. P. Bardsley states that in addition to running Red Cross trains over this line, a London and South Western Railway Adams 4–4–0 works regularly an afternoon train from Andover to Cheltenham, returning with the 5.15 p.m. from Cheltenham. Also Great Western 0–6–0 tender and tank engines work goods and occasionally passenger trains on this section, while Midland 0–6–0 goods engines are occasionally seen. A Great Western Railway 0–6–0 tank engine is also engaged on the Tidworth branch.

Mr. R. F. L. Tyrrell writes that he recently travelled in a troop train from Plymouth to Saltash which included in its make-up some North British Railway vehicles.

### The Northern Railway of France in War Time.

THE *Journal des Transports* recently gave some remarkable statistics of this system, which has suffered most of all the French lines. It comes, however, as a great surprise to find that, on September 3rd, 1914, of the 2,381 miles of the system, there remained only 428 in operation. Yet it was that section which carried out some of the transportation wonders of the war. In December, 1915, the mileage available had increased to 1,225. Of 768 stations, 346 were then in the hands of the enemy or closed for traffic, while some of the remainder are only used for military purposes. The sections in use include the main line from Paris to Creil, Amiens, Boulogne, Calais and Hazebrouck, with some double-track branches and single lines.

Apart from military requirements, first efforts were centred on serving the coal mines of the Departments of Nord and Pas-de-Calais, the output of which was to be used entire. The German invasion unhappily reduced the number of mines in operation and deprived France of the production of all coal in the Department of Nord and of most of the important mines of Pas-de-Calais (Courrieres, Lens, Lievin, etc.). But the coal mines in the non-invaded territory, that is to say Bethune, Bruary, La Clarence, Ferfay, Liguy, Moiles, Noeux and Verdun, organized rapidly and their production now equals and in some instances surpasses that in time of peace. It is a remarkable feat, in particular for the mines of Noeux and Bethune, which worked under hostile cannon fire and underwent almost daily bombardments.

### Traffic Statistics.

DURING the first half of 1915, the Northern transported (including reshipments) nearly 4,300,000 tons of combustibles against about 10,700,000 tons during the first half of 1914, a diminution of 60 per cent. Of this tonnage the mines of Pas-de-Calais furnished 2,700,000 tons against 8,300,000 in 1914, a diminution of 67 per cent. Importations of coal at the frontier, which had reached about 1,500,000 tons in the first six months of 1914, naturally disappeared. On the other hand, importations of coal at seaports rose in the same period from about 465,000 tons in 1914 to more than 890,000 tons in 1915, a gain of over 90 per cent.

During the first half of 1915 the total tonnage reached 7,200,000 tons against more than 24,000,000 tons for the corresponding period of 1914, a loss of about 17,000,000 tons, or 70 per cent. Comparing the traffic of the stations which were open in 1915 with the traffic of these same stations in 1914, a tonnage of 7,200,000 tons for the first six months of 1915 has to be placed against nearly 9,400,000 tons for the corresponding period of 1914, a loss of 2,200,000 tons, or only 23·1 per cent. It is necessary to remember, however, that commercial transportation was forcibly restrained on the Northern by the needs of the military and the necessity of dispatching on the few lines in operation numerous transports of troops, materials of war, munitions, provisions, etc., so that in reality exceptional work was done.

### Train Mileage.

DURING the first half of 1915 trains traversed about 9,796,000 miles against about 19,840,000 miles during six months of 1914, a loss of 50·7 per cent. But these figures by themselves do not give an exact idea of what is represented by the movement on the free portion of the Northern. One must not forget that the Northern was deprived by the invasion of almost all its lines of heavy traffic and that it was with arteries not suited to a dense traffic or with very heavy grades that all this business had to be cared for. The single track lines embraced in the non-invaded territory have further complicated affairs and brought about on certain lines a density of shipments out of proportion with that in times of peace. Thus on certain sections traffic attained double, even triple, that of peace times. A section of single track which had carried 20 trains a day on the average in 1914 bore 31 in 1915. On another the average daily movement rose from 12 trains in 1914 to 39 in 1915. But where the task was most formidable was on the few

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double track lines in operation. On a certain section of this the mean daily movement rose from 73 trains in 1914 to 178 in 1915; on another from 90 in 1914 to 194 in 1915; on a third, from 86 in 1914 to 195 in 1915; on a fourth, the movement, very heavy even in peace times, which called for a daily average of 140 trains in 1914, reached the sum of 219 in 1915. On one section of the line there were counted 285 trains on one day.

### Locomotive Matters on the South Eastern and Chatham Railway.

APROPOS of references to recent issues Mr. J. S. Bartlett writes:—"I may say that it is not quite correct that Stirling 'rebuilds' have a 'complete monopoly' of the Reading traffic, since I have on several occasions seen an 0-6-4 tank on the train arriving at London Bridge at 3.42 p.m. (when it came from Reading and not from Tonbridge only, as now). Also, though I travel regularly on it, I cannot remember having seen these engines on the Crystal Palace branch for some considerable time past, although I know they have been used on it at rare intervals."

Mr. Bartlett then asks why it is that the new Wainwright-Maunsell engines are never to be seen on the old Chatham main line and the Kent Coast Branch, in spite of the fact that the gradients are more severe and the trains almost, if not quite, as heavy as those on the Ashford and Hastings lines. Unfortunately engineering restrictions prohibit their employment on these sections, so that the big 4-4-0's are necessarily confined to the South Eastern main line and a few other sections. He also mentions a contrast in working observed recently. On a recent Saturday he saw attached to the 11.30 a.m. *ex*-St. Pancras Scotch express a compound (4-4-0) and a Johnson single, the train consisting of 13 bogie coaches (including a dining car). About a fortnight later he saw the 4.25 p.m. *ex*-Charing Cross, Ashford and Folkestone express, consisting of 12 bogie coaches, and it was hauled by a Belpaire Wainwright, unassisted. Although the Midland train was by about 40 tons the heavier and the average speed higher the great difference in the severity of the gradients would neutralise that, and as in this case the Midland train stopped specially at St. Albans and Kettering, the lengths of non-stop run in each case were about equal.

### Locomotive and Train Working in the latter part of the Nineteenth Century. The Great Western Railway (Standard Gauge).

"IN reference to the mention made of the North and West express trains between Bristol and Shrewsbury,"[1] writes Mr. J. Robson, "Mr. Ahrons has not mentioned a rather interesting incident that took place between the Midland and Great Western Railway Companies, about two months after this service was introduced. The two companies had each decided to run a fast special express, from Bristol to Leeds, to convey back to the latter place the Yorkshire people who had visited the annual wool fair, held at Bristol, in the month of September. It was to be nothing more or less than a race."

"My father was selected to drive the Great Western train from Bristol to Shrewsbury, the London and North Western taking the train from there to Leeds. Both trains started from the same platform, one on each side, and left Bristol at the same moment, 1 p.m. I may state that my father, although he was given a schedule time to run to, was instructed by the traffic and locomotive departments at Bristol, to do his best to beat the Midland, but they refused to withdraw the running instructions in force."

"The Midland put on an engine of the 2-4-0 type, but she was no match for No. 579, which got ahead of her from the commencement, in spite of the Midland road being straight at the platform and the Great Western road curved. My father, when backing on to the train at Bristol, opened the valves of the sand-boxes thereby coating the rails with sand for two or three hundred yards, which enabled him to get the single-wheeler away without any slipping. The Great Western train, which was composed of four 8-wheelers, passed under the bridge that carries the Midland Railway over the Great Western Railway near Stapleton, before the Midland train passed over, and cleared Severn Tunnel Junction—17 miles from Bristol—at 1.20 p.m., which latter information was telegraphed back to Bristol, when the train passed through. The Great Western train was booked to run from Bristol to Hereford without a stop, but unfortunately the signalman at Pontypool Road, thinking that the engine would require to take water at that station, let a stopping train out in front of the express, which was held up there for some time until the road was clear. From Pontypool Road to Hereford took 34 min., practically an average speed of 60 miles per hour. There was a 10 min. stop at Hereford, and 58 min. were taken to run from there to Shrewsbury, the train having had to be nearly stopped at each end of Dinmore Tunnel, to 'pick up' and 'return' the 'staff,' on account of the single road through the tunnel. Shrewsbury was reached at 3.30 p.m., and the train arrived at Leeds in appreciably less time than that taken by the Midland, but I do not remember the exact details."

### The 481 Class.

"MR. AHRONS is not correct," continues the same correspondent, "in stating that the 481 class, after being rebuilt, had boilers with 150 lbs. pressure. The pressure, I am sure, was not less than 160 lbs., and I rather fancy it was either 165 lbs. or 170 lbs. Mr. Ahrons also states that the Bristol portion of the North and West expresses had through carriages from Plymouth and Torquay to Manchester (London Road) and Birkenhead. These through carriages were not put on until 1892, when the narrow gauge was extended from Exeter to Penzance, and in reading the article it may lead readers to think these through carriages were put on in 1888."



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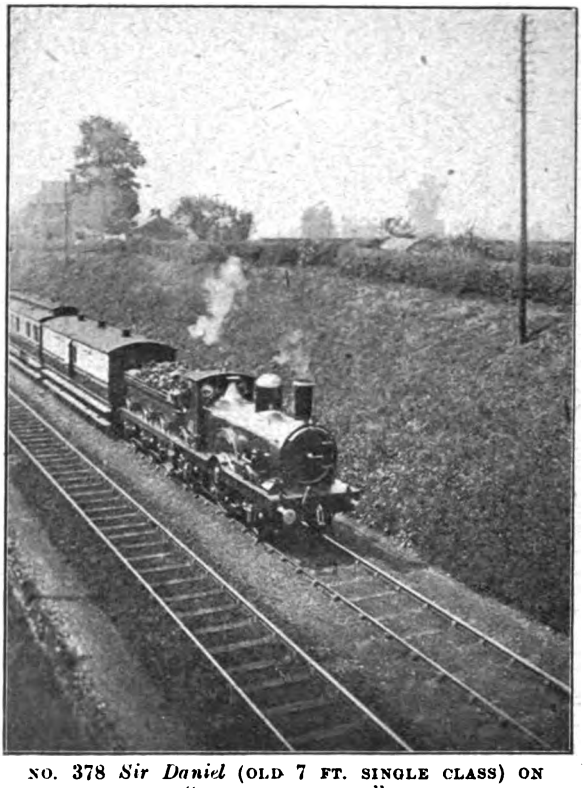
"In one of the previous issues Mr. Ahrons also states that the 6.20 p.m. fast from Paddington to Bristol was allowed 50 min. from Reading to Swindon. The time allowed was 51 min., the train being booked to leave Reading at 7.16 p.m. and to arrive at Swindon at 8.7 p.m. This train was worked by the Bristol enginemen with the 'Sir Daniel' class, and between Swindon and Bath, was the fastest booked train on the Great Western Railway, including the 'Dutchman' and 'Zulu' of the broad gauge. The time allowed was 37 min., whereas the latter were each allowed 38 min. Mr. Ahrons also mentions about the engines of the 'Sir Daniel' class being fitted with new boilers, in about the middle 'eighties, but omitted to state that the pressures were increased from 140 lbs. in the old boilers to 150 lbs. in the new ones, with the exception of engine No. 383, which only had 140 lbs., she being the first to be reboilered and to have driving-wheels fitted with 'box' or closed-in splashers. It was just about this time that the Great Western Railway started to raise the boiler pressures from 140 lbs. to 150 lbs. and upwards."



NO. 378 *Sir Daniel* (OLD 7 FT. SINGLE CLASS) ON "NORTHERN ZULU."
Photograph taken in 1893 by P. W. Pilcher.

### Bristol and Exeter Tank Engines.

IN regard to illustrations of the Bristol and Exeter tank engines, 4-2-4 type, with 9 ft. driving wheels, Mr. W. Babbage writes:—"The illustration on page 444, December, 1915, shows, as correctly stated, one as originally built, except that the original indiarubber block springs to the bogie axleboxes had been replaced by double elliptical laminated springs. Mr. Robson's photo on page 448 of June, 1916, shows one as originally *rebuilt* in 1868–70 at Bristol by the Bristol and Exeter Railway Company. The photo on page 445, December, 1915, shows one as rebuilt by the Bristol and Exeter Railway, but after being overhauled by the Great Western Railway at Swindon when taken over in 1876. The other photo on page 446, December, 1915, shows the final rebuild by the Great Western Railway at Swindon after the Flax Bourton accident."

Mr. Babbage continues:—"My grandfather fired on and drove one of these engines during the period 1854–1863. I have a great-uncle still living who did a lot of fitting work on them at various times in the Bristol shops, and another of my great-uncles had his arm torn out through grasping one of the moving spokes of the driving wheel, when the engine was fly shunting, to recover his balance on the lower footboard seen in the illustration on page 444, December, 1915. They were built to beat the narrow gauge for speed, and in the official trials reached a rate of 81·8 miles per hour, the highest on either gauge at that time."

### Railway Tickets: Their Origin, Use and Development.

AT the concluding meeting of the series of Operating Efficiency Meetings arranged by the London Underground Railways and the London General Omnibus Company group, for the 1915–1916 season, a paper on this subject was read by Mr. F. C. Bingham, of the Passenger Agent's Department. Mr. H. E. Blain, Operating Manager, presided over a good attendance. The paper, illustrated by a large number of slides, traced the development which had taken place in the booking of passengers from stage coach days to the present. A few extracts from Mr. Bingham's paper will be of interest.

On stage coaches, a system of booking was in operation which took the form of entries in a book, a waybill being given to the guard. These waybills contained the names and addresses and destinations of the passengers. Travellers from intermediate stopping points were only accommodated in the event of the coaches being short of their full complement. The first reliable information with regard to railway tickets being actually issued was in connection with the Leicester and Swannington Railway, which formed the nucleus of the present Midland

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Railway. This line was opened in 1832. Tickets of a metal form were introduced, the size being about 1½ in. in diameter. The first use of card tickets after the pattern of the present day tickets was about 1840, the idea being due to Thomas Edmondson, a Quaker, stationmaster of a small roadside station called Milton, on the Newcastle and Carlisle Railway. The inventor rented his patent at 10s. per mile per annum. Hardly any change in railway tickets has taken place in the eighty years which have elapsed.

### Tickets on the "Underground."

DETAILS of tickets on the Underground Railways were given, these being of two kinds, one being known to the printing trade as pulp, and the other as "ordinary card," the former being the cheaper and thinner production and being used for local bookings. The method of requisition and supply to stations was described, and the author then discussed various descriptions of tickets issued, including scheme tickets, workmen's tickets, and miscellaneous tickets. Slides were shown of a number of ticket-issuing machines, including the standard electrical machine, the pull-bar machine and the British Electrical automatic machine, the first-named being the one in general use on the Underground. It is constructed to issue any of the ordinary forms of tickets, the principle being that a coin weighs down a balance causing electrical contact, and resulting in a slide pushing a ticket forward for delivery. The pull-bar type is constructed on similar lines to the ordinary sweetmeat machine, whilst the British Electrical automatic machine prints and delivers a ticket.

The object of the various forms of railway ticket cancels (the name of the ticket nipping arrangements in general use) was :—

(1) To reveal whether the tickets were being punched at other than the stations at which they were issued ;

(2) To prevent the use of tickets for a second journey ; and

(3) To show in the case of traffic where several interests are involved and tickets are cancelled two or three times on a journey, the route which has been actually traversed, this being the determining factor in the division of receipts.

The methods and object of railway ticket sorting offices were also described, and amongst other interesting points mentioned, was the fact that the issue of the tickets on the Underground Railways amounted to about 300,000,000 per annum, as against 80,000,000 per annum on the whole of the London and North Western Railway.

### Omnibus Tickets.

ON the omnibus side, the issue of 'bus tickets was not introduced by the London General Omnibus Company until 1891, prior to which date a passenger paid his fare to the conductor, no voucher or ticket being given in exchange. Roll tickets were originally employed by the London Road Car Company, and their introduction in 1891 on the London General Omnibus Company led to a strike in June of that year, which lasted for about ten days. The roll system was only, however, continued until 1893, when the Bell Punch system was adopted. The various changes in this type of ticket were described and illustrations shown of the different forms of ticket in use, including two-journey, combined 'bus and rail, and other special tickets.

Various forms of punch were reviewed, and, in the subsequent discussion, it was pointed out that, although many attempts had been made to evolve an apparatus which would print and issue tickets on different denominations on some simple method, this had not yet been produced in a form which met with general approval, and the whole ticket system was one which called for close attention in the hope of improvement being effected.

### Locomotive by Ferry—Weekly!

"APROPOS of your interesting description of the Canadian Pacific Railway working timetable (in the February issue)," writes Mr. E. J. Miller, "the following notes may be apposite : The British Columbia Division of the Canadian Pacific Railway has on one of its lines a curious piece of working. Running down to the Kootenay Lake are several lines of railway, one of which has, at present, no physical connection with any other line of the company. This particular length of railway has a mixed train running on one day of the week only. To enable the train to be run a locomotive is put on to a *barge* and taken to the lakeside terminus by steamer—from the nearest section of the Canadian Pacific Railway—and after working the train is returned by the same means. The operation involves two hours' journey on Kootenay Lake, and to transport a locomotive on a lake for the express purpose of working a train service is perhaps unique in railway operation. It would be evidently unremunerative to let the engine be idle for the six days, to save the transit on the lake.

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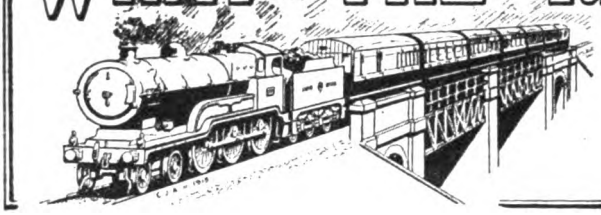
# WHAT THE RAILWAYS ARE DOING



A BOARD OF TRADE Order under the Special Acts (Extension of Time Act, 1915), is gazetted directing that the time limited by section 6 of the South Eastern and London, Chatham and Dover Railway Act, 1909, for the compulsory purchase of lands required for the widenings Nos. 1 and 2 authorised by section 4 of the South Eastern and London, Chatham and Dover Railway Companies Act, 1900, and for the construction of those widenings, shall be extended for one year from August 6th, 1916. When the Bill for strengthening and enlarging Charing Cross Bridge was rejected by the House of Commons in July last Mr. Pretyman, speaking for the Board of Trade, mentioned that the railway had had the power for a long time of widening the bridge. That power, said he, expired in August, but it could be extended by the Board of Trade.

* * *

MR. W. B. FARR, Engineer of the Rugby Division, London and North Western Railway, has retired after 44 years' service. He served his pupilage under the late Mr. H. Woodhouse, Engineer of the Southern Division, and subsequently carried out various branch railways, widenings, and bridge constructions; and, as Assistant Engineer of the Manchester, South Junction and Altrincham Railway, important works in the Manchester district. On the retirement of Mr. Woodhouse in June, 1886, Mr. Farr joined Mr. Harry Footner's staff, at Crewe; and was for a time chief of the Bridge Drawing Office, and afterwards on the Manchester Ship Canal Works, where he was in charge of the construction of the deviation railways at Warrington, including several bridges carrying the railways over the Canal. On completion of this work he returned to Crewe as general assistant to Mr. Footner. In 1902, he was promoted to be divisional engineer on the Rugby Division.

* * *

OF particular value is the programme of the London School of Economics for the Michaelmas term, and RAILWAY MAGAZINE readers able to avail themselves of the facilities offered should not fail to do so. The lectures on railway and cognate subjects comprehend "The Geography of the Railways, Waterways and Seaports of the War Area," a course of 10 lectures by Professor Sargent, on Thursdays, at 6 p.m., beginning October 5th. "Railway Economics—Operating," a course of 20 lectures by Mr. Stephenson, on Fridays, at 6.15 p.m., beginning October 6th. "Railway Economics—Commercial," a course of 20 lectures by Mr. Stephenson, on Thursdays, at 6.15 p.m., beginning October 5th. "The Law of Carriage by Railway," a course of 20 lectures by Mr. Disney, on Wednesdays, at 6.15 p.m., beginning October 11th. "General Economics, with special reference to Transport," a course of 10 lectures by Mr. Stephenson, on Mondays, at 6.15 p.m., beginning October 9th.

* * *

SINCE the commencement of hostilities, about 50 concerts have been given by the London and South Western Railway Musical Society, including entertainments to wounded British and Colonial troops, Flying Corps, troops in camps, Belgian refugees, and public performances in aid of charitable objects connected with the military, etc. The Concert Party is composed of a Male Voice Choir of about 30 members, augmented by a few friends and relatives belonging to the railway world, who provide the solo items. The audiences (numbering over 2,000 on occasions) have been most appreciative, especially the wounded soldiers, and the President of the Society (Sir H. A. Walker) has received many letters of thanks. Mr. C. J. Hooker, Audit Office, Waterloo, is Hon. Conductor and Musical Director, and Mr. E. F. Judd, General Manager's Office, Acting Hon. Secretary and Treasurer.

* * *

AFTER 41 years' service with the London and South Western Railway, Mr. J. S. H. Weaver, Chief Clerk in the Treasurer's Office, has retired on superannuation. He commenced as a junior clerk in the Stores Department in 1872, and after a short time was transferred to the Treasurer's Office, Waterloo, where he eventually became Chief Clerk, a position which he held for the last 22 years of his service. Mr. Weaver was appointed Secretary of the London and South Western Railway Savings Bank in 1889, but relinquished that office in 1892, in consequence of other and more important duties demanding his attention. Mr. Weaver has been for a long period an active and valued member of the Widows' and Orphans' Fund Committee; he also held the position of Trustee to the Clerical Staff Provident Death Fund from the time of its commencement.

* * *

FEW travellers on the London and North Western Railway are aware that the company grows its own osiers and makes its own baskets. This is, however, correct, and the operations of the twin industries, which are located at Ayles-



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bury, are succinctly explained in the September *London and North Western Railway Gazette*. Mention is made of luncheon and tea baskets, with which most travellers are acquainted. But, remarks the writer, the Refreshment Department's demands do not end here. It is necessary to have large provision hampers for the dining cars and linen hampers for the hotels; for these latter there are also wine and bottle baskets, the use of which is a great safeguard against breakages. Then there are the baskets used in the offices, more hampers, waste-paper baskets, and the always necessary trays for letters and documents. The parcels traffic on our great railways is of enormous volume, and hampers are needed for the conveyance of this branch of the work. These hampers are of large size and great strength; there was a fine specimen in the works, measuring inside (in inches) 50 by 20 by 34, lettered "Preston & Wyre Joint Railways." It was destined for the Fleetwood and Belfast traffic. There were also on view the hampers for the Irish traffic *viâ* Holyhead, with a grey band painted round them, these are used mainly for dairy goods from Ireland.

* * *

MR. MATTHEW D. ROBINSON, a son of Mr. J. G. Robinson, chief mechanical engineer, Great Central Railway, has devised an induced draught apparatus for locomotive fireboxes in which air is admitted by a number of holes placed in the firebox walls below the brick arch, either in the front or back or both, the air being induced by means of jets of superheated steam. From the steam dome steam passes a stop and regulating valve on the firebox back plate, and is led through the boiler to the smokebox tube plate by a pipe which passes through the tube plate into the smokebox. This pipe is connected to a superheater element, which traverses in series a suitable number of the smoke tubes by means of return bends. The steam thus superheated is then taken by another pipe outside the boiler to a number of air inlets in the front of the firebox proper. Each of these inlets is provided with a steam jet or nozzle, and an air inlet cone. In the back plate of the firebox on each side of the fire-hole are additional air inlets, similarly provided with steam jets and air inlet cones.

* * *

WE regret to record the death of Mr. James Learmonth, Assistant Chief Goods Manager, Caledonian Railway. Mr. Learmonth entered the Caledonian Railway service in March, 1874, as a clerk at Stirling goods station. He was subsequently employed as a clerk at Dundee West goods station and as chief goods clerk at Stobcross station, Glasgow. In September, 1888, he became Goods Agent at Partick station, and from that position he went to be Goods Agent at Bridgeton. In September, 1903, he was appointed Superintendent at Buchanan Street goods station, and in April, 1908, he was selected to be Superintendent of Canals and Docks and District Traffic Superintendent for the Larbert Section of the line. On July 1st, 1912, he was appointed District Goods Manager for the Western Section, and on June 1st, 1913, he became the Outdoor Goods Manager. On December 1st, 1915, he was appointed Assistant Chief Goods Manager, which position he held until the date of his decease.

THE LATE MR. JAMES LEARMONTH.
Assistant Chief Goods Manager, Caledonian Railway.

* * *

A NEWCASTLE-ON-TYNE newspaper, the *North Mail*, refers to the death of William Euston Crow, who was for many years associated with the firm of Robert Stephenson, in which connection Mr. Robert Weatherburn made many interesting references in the course of his "Reminiscences" published recently in our pages. Mr. Crow's father was with the original firm established on Tyneside by Stephenson, Pease, and Richardson in the early railway days, and eventually became Deputy Manager. The son entered the service of the firm as a youth, and came to Darlington when the works were transferred to Skerneside. He was a member of the managing staff until his retirement a few years ago. Deceased, who was 75 years of age,

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had a wide knowledge of engineering, and was a skilled locomotive builder.

* * *

THE Railway Executive Committee announced that, on and from September 1st, the prices for sleeping berths would be advanced, as follows:—

| | Old rate. | New rate. |
|---|---|---|
| From or to London and any other English station to or from places south of Berwick and Carlisle (both stations exclusive) .. .. .. .. | 7/6 | 10/- |
| Berwick and Carlisle and places north thereof .. .. | 10/- | 15/- |

The Highland Railway's charge for sleeping berths in Scotland is 7s. 6d. per berth.

* * *

MR. AUNGIER PEACOCK, recently appointed Stationmaster at Cambridge, Great Eastern Railway, has received from H.M. the King the Royal Victorian Medal in recognition of the 17 years during which, in addition to his other duties, he acted as Inspector in charge of Royal Specials run over the Great Eastern Railway. Mr. Peacock has had in his charge at one time or other nearly all the crowned heads of Europe. His services have been previously recognised by the presentation to him, 12 years ago, of a breast pin by His Majesty King George V. when Prince of Wales. Mr. Peacock entered the service of the Great Eastern Railway in 1885, and after working at Wisbech, Hunstanton, Peterborough and King's Lynn was brought to London as Traffic Inspector by the late Mr. Nettleship. He was afterwards Superintendent's Inspector for the Cambridge district, and in 1914 returned to London as Chief Inspector.

* * *

OWING to the retirement of Col. P. G. von Donop, under the age limit regulation, from the position of Chief Inspecting Officer of Railways, Col. J. W. Pringle, who was lent to the War Office when war broke out, has returned to the Board of Trade and been promoted to the position vacated by Col. von Donop. Lieut.-Col. Pringle was commissioned lieutenant, R.E., in February, 1883, and served in the Burmese War, 1885–87. For the period 1890–91 he was executive engineer, Zhob Valley Railway survey, and from 1891–93 served first as second in command, and latterly in charge of Uganda Railway survey. From 1896–98 he was Superintending Engineer on survey and construction of Hyderabad Godavery Valley Railway. He was at the War Office, 1898–1900, was appointed Inspecting Officer, Board of Trade, June, 1900, and in 1903 was appointed to inspect Uganda Railway on its completion. He mobilised on August 4th, 1914, as Deputy Director, Railway Transport, Home Defence, with temporary rank of colonel, and served in that capacity until his appointment to be Chief Inspecting Officer of Railways.

* * *

THE President of the Board of Trade has appointed a Committee, consisting of Mr. H. Courthorpe-Munroe, K.C. (Chairman), Mr. F. W. Goldstone, M.P., and Mr. J. C. A. Ward, to inquire into cases brought before them in which, after appeal to the General Manager of the railway company concerned, it is alleged that the instructions regarding the release of railwaymen for active service, issued by the general managers of the British railway companies at the request of the Railway Executive Committee, have not been followed, and to report to the Board of Trade what action, if any, is called for in each case.

* * *

ALTHOUGH it is now (writes an occasional correspondent) some nine years since the last of the 5 ft. 2–4–0 side tanks, converted from the old "Crewe" goods class, was withdrawn from service on the London and North Western Railway, there is still, or was recently, at work at the Abram Company's Colliery, near Wigan, an engine of this class purchased from the London and North Western Railway so long ago as 1892. This particular engine has an interesting history. Built at Crewe Works in October, 1852, as a tender engine, it was originally No. 293 *Quicksilver*. In 1860 it was transferred to the Southern Division of the London and North Western Railway, and was renumbered 352, the name then being removed. When the renumbering of the Southern Division engines took place about 1862–3, this engine became No. 952, and shortly afterwards it was converted at Crewe to a side tank by Mr. Ramsbottom. In May, 1883, it was put on the duplicate list and numbered 1841. Finally, in 1887, its number was altered to 3062. A similar engine was also, in 1903, purchased by a North Staffordshire colliery company, but this, the writer believes, was scrapped a few years ago.

* * *

THE remaining seven of the new series of four-cylinder passenger engines ("Claughton" class) are now in hand at Crewe, Nos. 1093 *Guy Calthrop*, 1345 *James Bishop*, 2174 *E. C. Trench*, 2204 *Sir Herbert Walker*, 2221 *Sir Francis Dent*, 2338 *Charles H. Dent*, and 2395 *J. A. F. Aspinall*.

* * *

UNDER the Time (Ireland) Act, the clocks in the Emerald Isle will, on Sunday, October 1st, be put forward 35 minutes so that Irish time and Greenwich time from thenceforward will be the same. It is estimated that the change has necessitated 2,000 alterations in the October railway time-tables.

* * *

A VISIT to Hull has been made by the Canadian Trade Commission. Under the guidance of Mr. E. Watkin (General Manager of the Hull and Barnsley Railway) and of Mr. J. W. B. Wilcock (Divisional Goods Manager of the North Eastern Railway), the Commission made a tour of the King George Dock, and from the top of the warehouses had a splendid bird's-eye view of the vast dock and its equipment. A Hull correspondent states the members were obviously impressed by all they saw, as they were later by the coaling appliances at the Alexandra Dock, a demonstration being given by the tipping of a steamer.

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MUCH sympathy has been bestowed on Mr. R. S. Skillington, the popular District Goods Manager, London and North Western Railway, Northampton, who has lost a son, Second Lieutenant H. Skillington, in the great British advance against the Germans in France.

* * *

AT the age of 22, Mr. Frederick Hempster stands 8 ft. 2 in. high, and he is stated to be still growing at the rate of four inches a year. He is said to be the tallest and best proportioned giant in the world. A native of Bayswater, London, his home is now at Seend, in Wiltshire. His weight is 27 stones. He tours the country a great deal, which led to the unusual request being made to the Great Western Railway to allow him to ride in the guards' vans, owing to his finding an ordinary carriage too small. When travelling by train (says *The Great Western Railway Magazine*) he uses a special chair, and for his bed in lodgings three ordinary beds are placed together and he sleeps across them. He can comfortably light a cigarette at a street lamp, and span two octaves on a piano. The girth of his fingers is such that a penny will pass through his signet ring, and he takes size 22½ in boots.

* * *

NEW 4–4–0 engines designed by Mr. Pickersgill for the Caledonian Railway have been built at St. Rollox works (Nos. 115, 124, etc.), and have double bogie tenders. Others (936, etc.), have been built by North British Locomotive Co., Ltd., at their Atlas Works, Glasgow, and have six-wheel tenders. The pioneer of the class was illustrated in our May number.

* * *

RECENTLY the newly constructed rifle range, situated above the parcels sheds on the east side of Liverpool Street station, was opened by Lord Claud Hamilton, M.P. (Chairman, Great Eastern Railway). His lordship was accompanied by the Rt. Hon. Sir Ailwyn E. Fellowes, K.C.V.O. (Deputy Chairman), Lord Eustace G. Cecil, the Rt. Hon. Viscount Knollys, G.C.V.O., John Kenneth Foster, Esq., C. E. Ellis, Esq., and the General Manager, Chief Traffic Manager, Chief Civil Engineer, and other officers.

* * *

RESTAURANT cars have been withdrawn by the North British Railway from the trains leaving Glasgow (Queen Street) at 4.0 and 6.0 p.m. for Edinburgh, and from the 4.0 and 6.28 p.m. trains from Edinburgh (Waverley) to Glasgow.

* * *

AT the recent Trade Union Congress in Birmingham, Mr. A. G. Walkden moved a resolution calling upon the Government to nationalise the railways completely, and, at the same time, arrange for the trade unions concerned to have such a share in the management of the railway system as would enable railway workers to have a real voice in the control of the conditions of their life and work. Mr. J. Havelock Wilson opposed the resolution. He asked had the railwaymen considered for one moment what State control meant? Had they not had sufficient experience of State officials? If they got the railways under the State did they imagine for a moment that their position was going to be any better than it was now? Trade unionism should rely on its own strong arm and not allow itself to be undermined by calling for State control. The more State control they got the worse it became for the worker. He hoped he would be supported by the delegates. The resolution was declared carried, Mr. J. H. Wilson challenging the vote.

* * *

ONCE again the North British Railway has made the annual awards for the best-kept stations. Twenty stations have gained prizes in the first-class section, forty in the second class, sixty in the third class, and eighty in the fourth class. A sum of £400 is, therefore, disbursed among the stations concerned. Likewise the Glasgow and South Western Railway awards have been made. The competition is for the best-kept and most attractive platform flower gardens or borders at stations, and is open to all stations on the system. In allocating the prizes, not only the cultivation of plants and flowers grown, but also the neat and attractive arrangement of these is taken into consideration, as well as the general appearance of the station itself. On the Glasgow and South Western system £150 is disbursed, and there are five classes. First-class section contains twelve awards, the second class ten, the third ten, the fourth five, while the fifth class has ten awards.

* * *

AN American writer gives facts and figures to show that American railroads, as compared with the German, generally pay twice as high wages—after taking everything into consideration—and furnish better services at lower rates than any State-owned railways in the world. The German employees are more poorly paid and are subject to martial law. Except as regards trespassers, the German railways kill, per mile of line, four times as many passengers and three times as many employees; on the other hand, per number of passenger-miles there is little difference, though as regards employees the Americans show an advantage in every respect. Then as to speed: the fastest German short-distance train, before the war, ran 178·2 miles at the rate of 55·1 miles per hour; the fastest long-distance train ran 860 miles at 39·5 miles per hour. In the States there are many short-distance trains running at 60 miles per hour and over; while the "Twentieth Century, Limited," does its 979 miles at 48·9 miles per hour. The German rolling-stock also compares unfavourably, as a rule, with American; the passenger coaches are not so comfortable, and the goods wagons have a total tonnage capacity of only one-seventh of a ton *per capita*, as compared with nearly 1 ton in the States; while only 6 hours free demurrage is allowed in the former and 2 days in the latter. No more than 34.6 per cent. of all German goods vehicles had brakes in 1911 (the last year available, quoted throughout), and only a few of these had air brakes. First-class in Germany is dearer than Pullman

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and sleeping car in America, and second-class in the one is also dearer than first-class in the other. The goods rates work out at 200 per cent. higher in the first than in the second.

* * *

FROM an Australian correspondent we learn that at the opening of the Lake Grace Railway (25 miles), the latest agricultural railway extensions in Western Australia, the Premier stated that during the last 4½ years the Government had constructed 900 miles of railways. The expenditure on these extensions was perfectly justified, and its continuance was essential to the best interests of agriculture and the State as a whole. The new line provides facilities for the settlers of the Wagin-Kukerin and Lake Grace districts to forward their wheat and other produce to market.

* * *

BRIEF particulars have arrived of the inauguration in August of the first electrified line in Argentina. At present only the route from Retiro *viâ* Victoria is concerned, but the opening marks the completion of the first stage of what will be a most important electrification.

* * *

MR. W. F. KNIGHT, who has been serving on the Queensland Government Railways for the past seven years, was recently selected by the Management to fill the post of Acting Ambulance Officer. He spent the first sixteen years of his railway life on the Great Western Railway in London, Newport, Cardiff and Slough. He commenced the study of first-aid in connection with the Great Western Railway Centre in 1903, from which time he became an enthusiastic ambulance worker, joining the St. John Ambulance Brigade and the Military Home Hospitals Reserve. He has maintained his ambulance efficiency year by year, and is the holder of medallions and other awards gained in this country and others gained in Queensland. He was successful this year in securing the much-coveted "Thallon" gold medal for ambulance work, which is the highest ambulance award that the State of Queensland has to offer.

MR. GILBERT HARVEY-KELLY.
Assistant Traffic Manager,
Siamese Southern Railway.

APPROVAL by the Russian Council of Ministers has been given the suggested Obi-Ural-Bielomorsky Railway. Starting from Archangel, this railway will be built to Pinega and will traverse the Ukhtinsky district, crossing the River Petchora in the vicinity of the village of Troitzko-Petshersk, and will proceed to the port on the River Obi in the vicinity of the Chemashevsky settlement (the Novitsky works). After the line has crossed to the eastern slope of the Ural Mountains, a branch line will be built from one of the stations to the Nadeshdinsky Works of the Bogoslovsky Railway. The total length of this railway will be about 1,000 miles. As this line will pass through the dense forests of the basins of the Mezen, Petchora and Obi, it will facilitate the exploitation of these forests and will thereby increase the revenue of the Forestry Department, as well as promote the export trade in timber. It will also provide a cheaper route for the exports of raw materials, chiefly grain, from Siberia. Moreover, it will connect the mining districts of the north-eastern slopes of the Urals with newly-discovered rich deposits of iron ore and mineral fuel.

* * *

ON this page is presented a portrait of Mr. Gilbert Harvey-Kelly, recently appointed the Assistant Traffic Manager, Siamese Southern Railway, Siam. Mr. Harvey-Kelly served from 1909 to 1913 as an Assistant Traffic Superintendent on the Burma Railways, and from 1913 to the present year in a similar capacity on the Eastern Bengal State Railway. His new appointment is on the line which is constructing to join up the Southern Railway of Siam with the Malay States Railway to Singapore.

* * *

SIR WILLIAM GARSTIN, Chairman of the Egyptian Delta Light Railways, Ltd., has paid an eloquent tribute to the late Lord Kitchener. "I would wish," he said, "to take this opportunity of recording our deep regret at his death, and our gratitude to him for the help that he consistently gave us during his stay in Egypt as

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Minister and Consul-General. Throughout that period he proved himself a good friend to our enterprise. He, from the first, realised what a useful part our light railways played, and might play, in the direction of enabling the agriculturist to transport his produce quickly and easily to the industrial centres, and by acting as feeders to the State railways. He keenly desired to see our system developed upon larger lines, and it was mainly with this end in view that he advised the Egyptian Government to grant us our revised concession—an act for which we have good reason to be grateful to his memory."

* * *

SELECTED for new depôts on Canadian lines, the following names suggest that where new districts are being opened up, the war provides a wide choice of nomenclature:—Canadian Pacific Railway: Asquith, Kitchener, and Ypres; Canadian Northern Railway: Beatty, Jellicoe, Joffre, and Mount Cavell; Grand Trunk Pacific Railway: Dinant. The station named "Hope," referred to on page 148, August RAILWAY MAGAZINE, has been re-named "Haig."

* * *

THE Canadian Pacific Railway has commenced providing homes for war veterans, and has engineers at work in the irrigation section east of Lethbridge, laying out 20 ready-made farms of 90 acres each, on which returned soldiers will be placed.

* * *

THE retirement of the South Australian Railways Commissioner, Mr. A. B. Moncrieff, C.M.G., involves important changes. Mr. Moncrieff relinquished the position at the end of June, but he will not officially sever his connection until July 1st, 1917. In the meantime, Mr. J. McGuire has been appointed Acting Railways Commissioner, and Mr. A. N. Day Acting General Traffic Manager. Mr. C. Boykett, Chief Clerk in the Railways Commissioner's Office, succeeds Mr. Day as Secretary to the chief railway official in the State. The Government propose to introduce a Bill next Session for a Board of three Commissioners, and to establish a constructive branch. With that policy in view no permanent appointments will be made yet.

* * *

NEW railways under construction in New South Wales, or just on the point of completion, aggregate over 1,300 miles, and represent a capital cost of about £8,250,000. These are exclusive of the circular railway through the city, and the eastern and western suburban lines, estimated to cost about £6,000,000. Nor do they include the Sydenham-Botany line or the network of suburban loops and duplications nearing completion to facilitate the handling of the enormous goods traffic.

* * *

THE Holland Railway and the Company for the Exploitation of the State Railways in Holland will in so far combine that the receipts will be pooled, each company getting its portion thereof at the end of the year in accordance with the goods and passenger traffic on their respective lines.

THE *Central Argentine Railway Magazine* sends copies of the coloured supplement to the June number, showing the composition of the express train which runs between Buenos Aires and Rosario. Readers desiring prints should send to Bme. Mitre 299 (Oficina 93), Buenos Aires.

* * *

MR. M. M. HENDERSON, Chief Mechanical Engineer of the Commonwealth Railways, who has returned to Australia from a tour of America and Great Britain, has presented a comprehensive report to the Minister for Home Affairs dealing with various phases of railway working. Mr. Henderson states that the all-steel coach is not generally favoured by the responsible authorities of the railroads in America, owing to certain defects which become manifest after being in operation for some time. 'These defects at certain places cannot be overcome without materially increasing the weight of the coach, or spending considerable sums on maintenance. The class of coach proposed to be used on the Commonwealth Railway is the composite type, with all-steel underframe, framing, and outside sheathing for the purpose of affording better protection in case of end-on accident, but the internal fittings, together with the roof and certain other parts, will be made of timber. He adds that the best railway systems of Great Britain have officers continually in America making observations on the development in that country, and in a number of instances such British railway companies insist on their leading officer visiting America in connection with their particular section at least once every two years.

* * *

BEARING in mind the large number of Railway Club members who are serving King and Country in the fighting forces of the Crown, the September meeting must be registered as a numerical success as well as a function which well repaid attendance. Held at headquarters, 92, Victoria Street, London, S.W., at 7 p.m., on the second Tuesday in the month, a paper which provoked much discussion and no small meed of praise was read by Mr. J. F. Gairns, his subject being "The Electric Locomotive." On Tuesday, October 10th, at 7 p.m. Mr. A. W. Bartlett will present a paper on "The North London Railway." Interested visitors will be welcomed.

* * *

MR. C. WILLIAMS, of 73, Chetwode Street, Crewe, asks us to announce that in view of the fact that he contemplates issuing a revised edition of his well-known lists of London and North Western Railway locomotives, he is prepared to send a copy of his 1912 complete list and of the 1913 supplementary list at half price, the two for 1s. 1d., post free.

* * *

2-4-0 engine No. 185, Glasgow and South Western Railway, illustrated on page 255 of this issue, is of 18 class and not 137 class as stated.



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ONE of the most notable of men who have worn the uniform of the London and South Western Railway has passed away. We refer with regret to Inspector Ness Wilson, of Waterloo Station, London, S.E., whose portrait appears on this page and whose death occurred on 12th September. A Yorkshireman, born 58 years ago, Mr. Wilson began his railway career at Waterloo in 1878 and became staff inspector in 1895. Public-spirited, sympathetic and of wonderful energy in well-doing, Inspector Wilson was greatly respected by the uniformed staff at Waterloo and highly regarded by the leading officials of the railway. Among his many activities the following may be mentioned :—

1. Principal Founder of the London and South Western Railway Supplementary Pension Society. Trustee and Chairman of the Committee since its inception.

2. Chairman of the Locomotive, Goods and Traffic Joint Committee for the obtaining of Interchange Privilege Tickets.

3. Trustee for the London and South Western Railway of the Railwaymen's Convalescent Homes. (One of the original trustees appointed when the scheme was originated.)

4. Chairman of the first Committee for obtaining Sunday Pay (1890–1), which, although unsuccessful, paved the way for the success of the second attempt.

5. Chairman of Sir Charles Scotter's testimonial Committee.

6. Chairman of the Waterloo Station Staff Dining Rooms Committee.

LATE INSPECTOR N. WILSON,
Waterloo Station, London, S.E.
London and South Western Railway.

7. Chairman of the Clapham Junction Branch of the Amalgamated Society of Railway Servants, 1893–1896.

8. Treasurer of the Battersea and Clapham Junction Branches, Amalgamated Society of Railway Servants and National Union of Railwaymen (Orphan and Benevolent Funds) for the last 15 years.

9. Member of the South Western Railway Orphanage Committee.

10. Member of the Committees for the relief of the relatives of the officers and crew who lost their lives in the s.s.'s *Stella* and *Hilda* disasters.

11. Member of the last of the old vestries for Battersea.

12. Trustee of Court 5756 Ancient Order of Foresters.

On the 22nd November, 1905, Inspector Wilson was presented with an illuminated address, an inscribed gold watch and a purse of money subscribed by over 4,400 of the officers and servants of the London and South Western Railway in recognition of his efforts for the improvement and advancement of his fellow-men. He was of literary tastes and had journalistic leanings, being the writer of numerous articles on railway and general subjects, which have been published in various periodicals, including the RAILWAY MAGAZINE, and at one time he was a regular contributor to the *Railway Herald*, a weekly journal formerly published for railway workers of all grades.

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**4—6—4 MAIN LINE TANK LOCOMOTIVE No. 327, "CHARLES C. MACRAE": LONDON, BRIGHTON AND SOUTH COAST RAILWAY.**

Designed by Mr. L. Billinton, Locomotive Engineer, and built at Brighton Works.
Fitted with superheater, feed water heater, and Weir feed pump.

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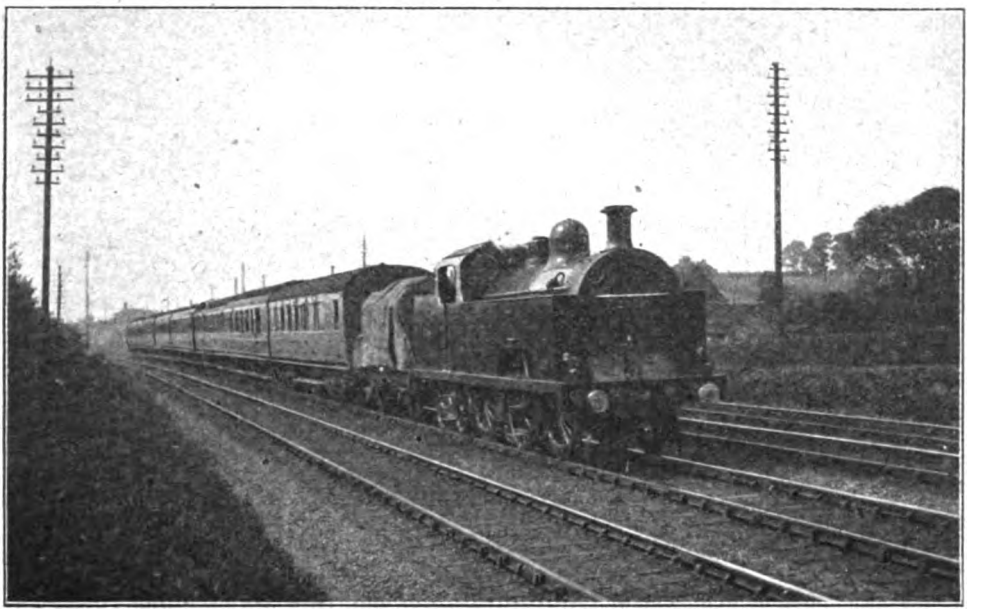

*Photo]* [*C. H. Tidman.*

HEYSHAM–ST. PANCRAS TRAIN NEAR HATHERN.
0–6–4 tank engine No. 2018.
The Midland Railway has forty 0–6–4 tank engines, out of a total for the class of 100.

# Tank Engine Types of the United Kingdom.

**By J. F. GAIRNS.**

IN the June RAILWAY MAGAZINE the writer dealt with the various tender locomotive types in use within the Empire; it has been suggested that corresponding treatment of the tank engines would also be appreciated, but owing to the wide extent of subject matter available, it will be necessary in this case to confine attention to the railways of the United Kingdom. As before, remarks are based upon statistics made public by the Annual Reports issued for the year ending December 31st, 1915, though as tank engines are used by all the small railways, as well as by the larger ones, consideration cannot be quite so complete as in the case of the tender engines. Therefore the tables upon which comparative remarks are based cover only 52 railways, of which three joint lines—Midland and Great Northern Joint, Somerset and Dorset Joint, and the Northern Counties section of the Midland Railway, Ireland—do not classify in detail. But these 52 systems account for 9,709 out of the total of 9,988 tank engines recorded, and the majority of those not covered are of small contractors', light railway or other types such as are employed on so many of the small railways which are in operation within the confines of the United Kingdom, and therefore possess only limited interest.

Although the home railways are noted for their tank engines, for nowhere else are such types so extensively used, it is interesting to observe that of the 10 lines which possess more than 1,000 locomotives, only one, the Great Western, has more tank than tender engines, and of its total of 1,700 of the former class, no fewer than 1,106 are of the ubiquitous 0–6–0 type, nearly all of the saddle-tank variety characteristic of that railway. Several railways have more than half as many tank engines as they have of tender engines, as shown by the comparative figures given below:—

| | Tender Locos. | Tank Locos. | Total. |
|---|---|---|---|
| Caledonian .. .. .. | 602 | 401 | 1,003 |
| Great Central .. .. | 884 | 455 | 1,339 |
| Great Eastern .. .. | 730 | 554 | 1,284 |
| Great Northern .. .. | 876 | 483 | 1,359 |
| Great Western .. .. | 1,384 | 1,700 | 3,084 |
| Lancashire and Yorkshire .. | 872 | 701 | 1,573 |
| London and North Western .. | 1,957 | 1,094 | 3,051 |
| Midland .. .. .. | 2,259 | 754 | 3,013 |
| North British .. .. | 718 | 336 | 1,054 |
| North Eastern .. .. | 1,306 | 683 | 1,989 |



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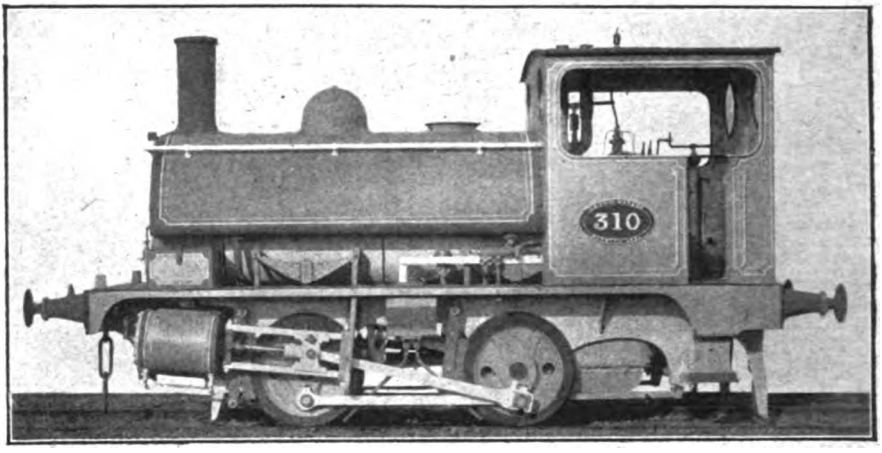
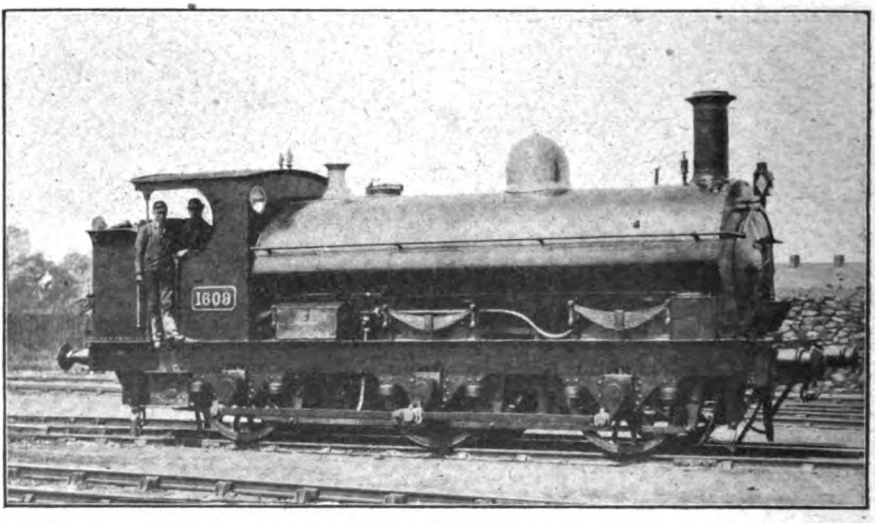
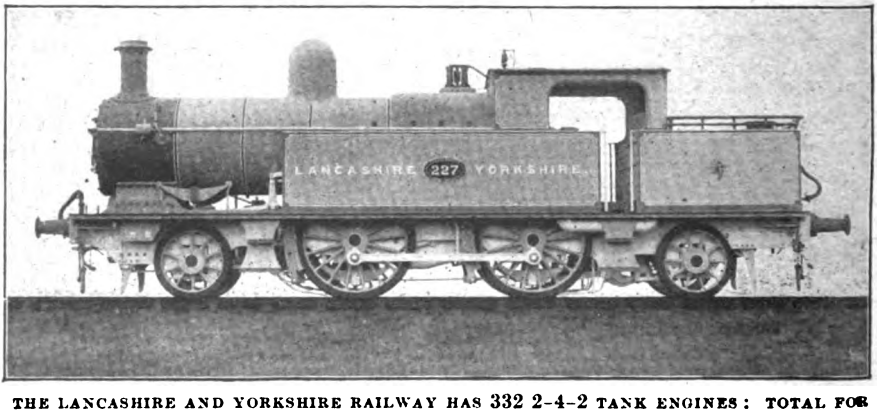



OF 339 0-4-0 ENGINES, 76 ARE OWNED BY THE LANCASHIRE AND YORKSHIRE RAILWAY.




THE GREAT WESTERN RAILWAY HAS 1,106 0-6-0 TANK ENGINES: TOTAL FOR TYPE, 3,748.




THE LANCASHIRE AND YORKSHIRE RAILWAY HAS 332 2-4-2 TANK ENGINES: TOTAL FOR TYPE, 1,844.

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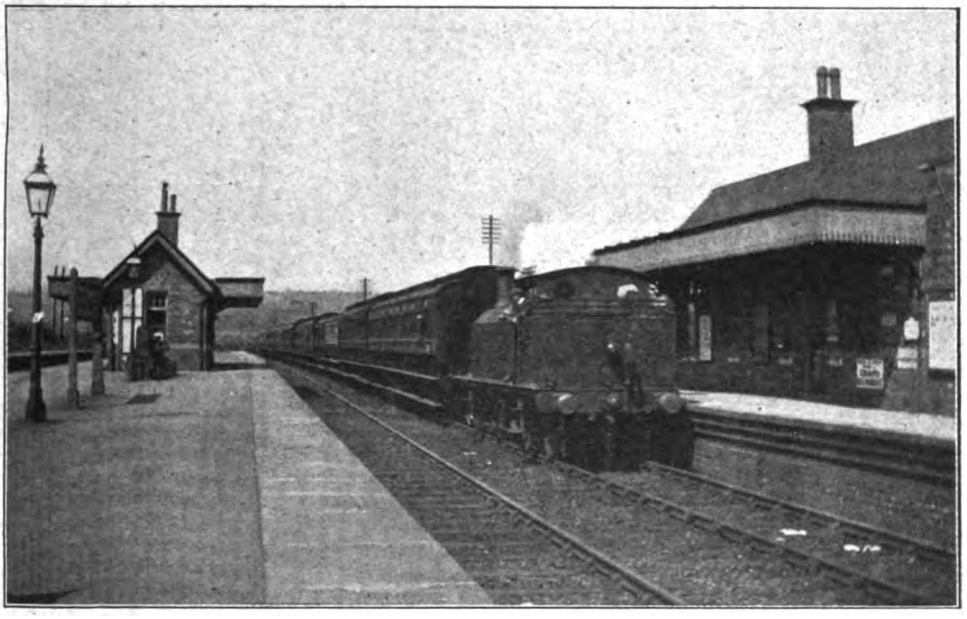
The characteristics of some of these railways are indicated by these figures. Thus, whereas the Midland, where the 0–6–0 tender classes are so general, has only 754 tank engines, as compared with 2,259 of tender classes, the Great Western has more of the former than of the latter, and on the London and North Western Railway there are 1,094 tank engines and 1,957 tender engines. The London and South Western comes a little below the 1,000 total, with 946 locomotives, of which 397 are of tank types. The London, Brighton and South Coast retains its character as a tank engine line, seeing that of its 607 locomotives no fewer than 440 are

| | Tender Locos. | Tank Locos. | Total. |
|---|---|---|---|
| Great North of Scotland .. | 99 | 24 | 123 |
| Great Southern and Western | 250 | 71 | 321 |
| Highland .. .. .. | 122 | 28 | 150 |
| Hull and Barnsley .. .. | 125. | 61 | 186 |
| Midland and Great Northern Joint .. .. .. | 83 | 19 | 102 |
| Midland Great Western .. | 122 | 17 | 139 |

Of these the Midland Great Western Railway of Ireland is the most exceptional, seeing that not only are there only 17 tank engines, against a total of 122 tender engines, but all these are of one type, the 0–6–0. Other lines noted are mainly of a class where there is not much scope for tank engines,



*Photo]* [*W. L. H. Auld.*

0–4–4 TANK ENGINE ON TRAIN PASSING KIRKSTALL.
The Midland Railway has 231 engines of this type: total on all lines, 1,238.

of tank types, while the North Staffordshire has 127 out of a total of 191, and the Taff Vale 188 out of a total of 251. The South Eastern and Chatham Railway has an average distribution of 266 tank engines to 453 tender locomotives.

Several railways which rank among the larger systems use tank engines only to a limited degree, and these may be noted in the following table :—

| | Tender Locos. | Tank Locos. | Total. |
|---|---|---|---|
| Cambrian .. .. .. | 74 | 26 | 100 |
| Furness .. .. .. | 83 | 53 | 136 |
| Glasgow and South Western | 477 | 52 | 529 |
| Great Northern (Ireland) .. | 170 | 34 | 204 |

most of those in use being reserved for branch work, or for shunting and special duties.

On the other hand, there are several railways which depend mainly upon tank engines, and of these the Barry (144 tank engines, 4 tender engines), North London (99 tank engines, no tender engines) and the Rhymney (121 tank engines, no tender engines) Railways are the most remarkable.

No fewer than 26 different wheel arrangements call for attention in this article, a number which can only be appreciated when the possibilities provided by from 4 to 16 wheels per engine are investigated. There

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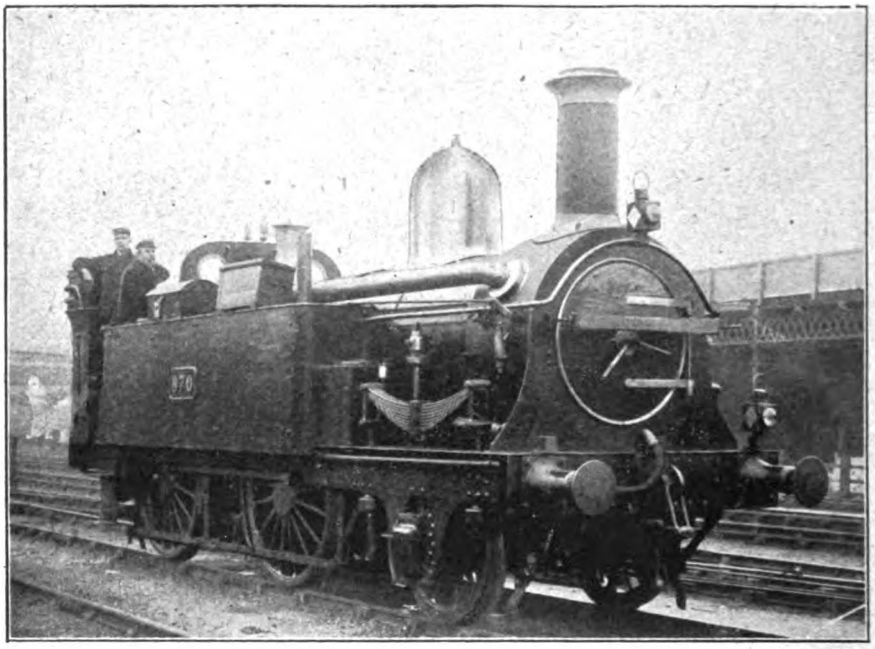
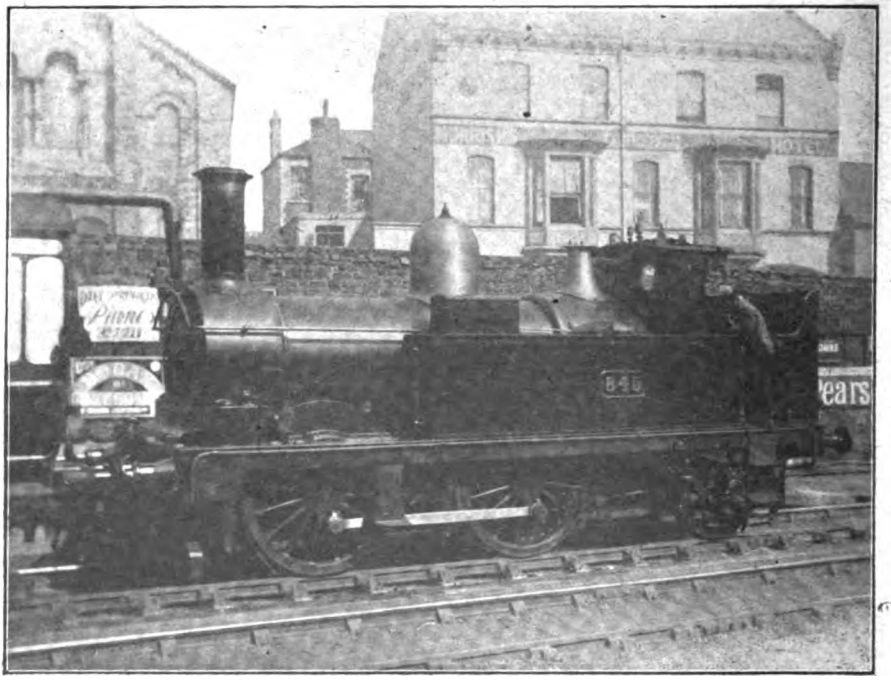


2-4-0 TANK ENGINE: GREAT WESTERN RAILWAY.
Of 218 engines, this railway has 123.



*Photo]* [*H. L. Hopwood.*

0-4-2 TANK ENGINE: GREAT WESTERN RAILWAY.
Of 313 engines of this type, this railway has 155.

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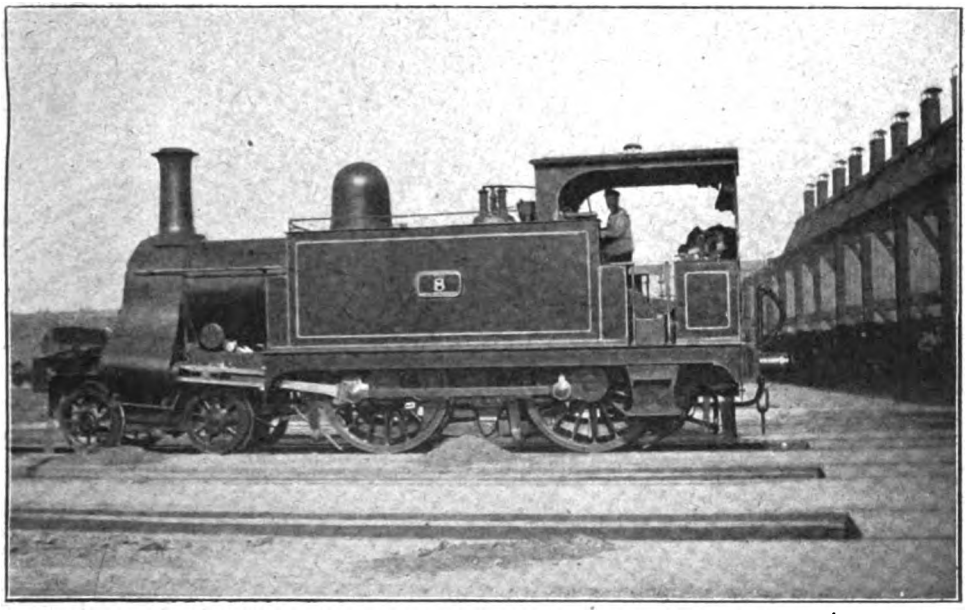
are, however, relatively few engines with more than ten wheels, so that a number of special wheel types are included in the 26 referred to, and the large majority of the engines are of quite simple classes.

Starting with the smallest practicable total of wheels, it is worth noting that of the three possible types one is not used. On the London and South Western Railway there are 8 four-wheeled single-driver tank engines (2–2–0 type). These are the little engines used for working motor trains in various districts. Later engines on this line for similar duties are four-coupled, and are therefore classed with the useful and highest is the Caledonian, with 52, followed by the North British with 39, the London and South Western with 34, and the Midland with 33. The type is, however, a fairly widespread one, seeing that 24 out of the 52 railways covered have at least one of these engines. The most notable omissions are the Great Northern and London, Brighton and South Coast Railways, which have no four-wheeled engines at all.

With six wheels four types are in use. The Dublin and South Eastern Railway still retains its two old 2–2–2 tank engines; otherwise the types are 2–4–0, 0–4–2 and 0–6–0. The last-mentioned is still used for



*Photo]* [*H. L. Hopwood.*

THE NORTH LONDON RAILWAY HAS 77 ENGINES OF THE 4–4–0 TYPE: TOTAL ON ALL LINES, 117.

numerous 0–4–0 locomotives, which total 339 on the 52 railways with which we are principally concerned. The only other four-wheeled engines are those which constitute components of rail motor cars, some of these being single drivers, but a majority of four-coupled designs.

Several railways have fairly large totals of four-wheeled engines, nearly all of these being yard and dock shunters or works locomotives of various classes. The highest otal is found on the Lancashire and Yorkshire Railway, where there are no fewer than 76 engines of the 0–4–0 type. The next

new construction, though a large proportion are old engines; but the other two are essentially types of the past, though many engines still remain and do good service. Of the 0–6–0 type there are no fewer than 3,748 engines, a total far exceeding that of any other type, and constituting some 37 per cent. of the whole number of tank engines at work. As compared with 1914, last year showed a diminution of 3 engines of this type, but on most standard railways these engines are in use, either as yard and dock shunters and works engines, or for local goods, and in some cases passenger duties also.

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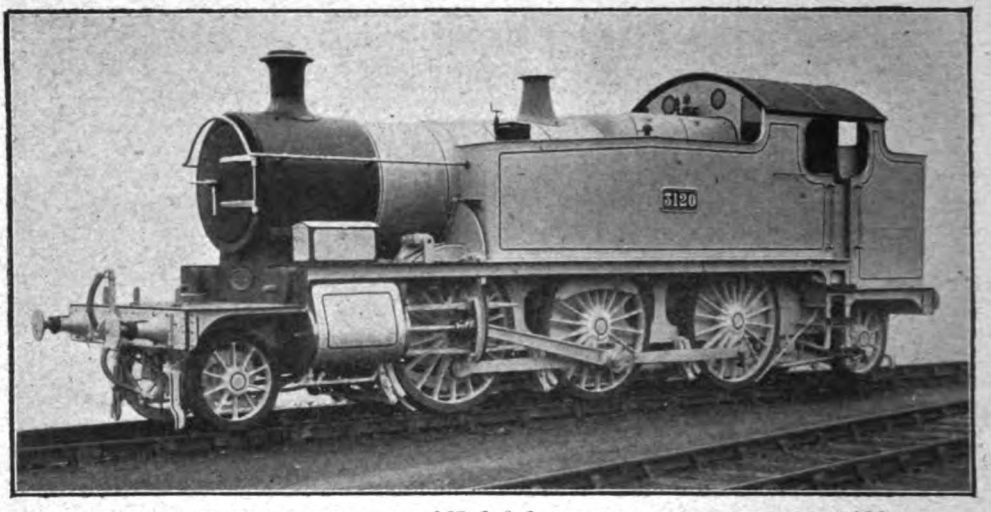
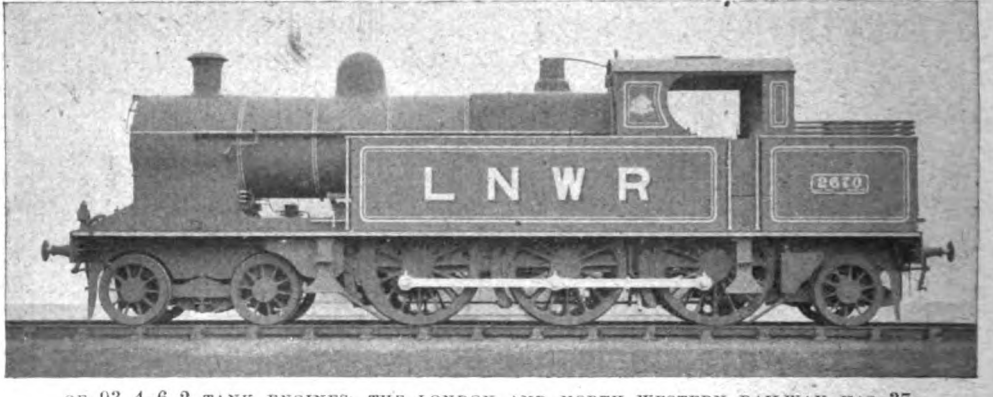
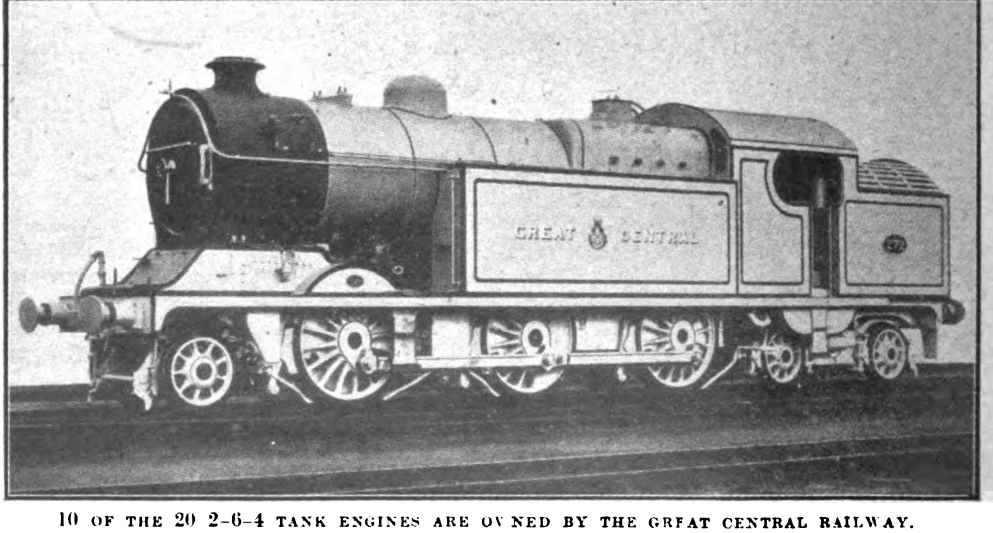



THE GREAT WESTERN RAILWAY HAS 167 2–6–2 ENGINES: TOTAL FOR TYPE, 196.




OF 93 4–6–2 TANK ENGINES, THE LONDON AND NORTH WESTERN RAILWAY HAS 37.




10 OF THE 20 2–6–4 TANK ENGINES ARE OWNED BY THE GREAT CENTRAL RAILWAY.

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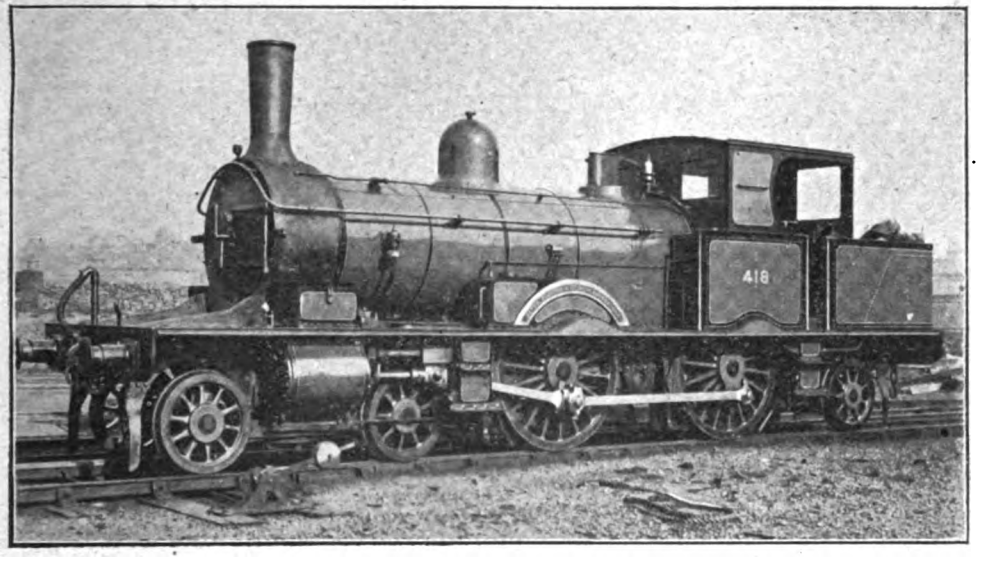
Omissions of this type apply almost entirely to Irish lines, principally narrow-gauge systems where special types are in use, or to small lines; but on light railways and the like it is a very common type. At the head of the list is the Great Western Railway, where, as already remarked, there are no fewer than 1,106 of these engines, the large majority being the familiar saddle tanks so usual on that line. Of the 52 lines noted no fewer than 37 acknowledge this type, and nine of these—Caledonian (186), Great Eastern (262), Great Northern (266), Great Western (1,106), Lancashire and Yorkshire (244), London and North Western (293), Midland (358), North British (146), and North Eastern (250)—call for special note, seeing that 20 railways only account for 218 engines of the 2–4–0 class, while only 13 lines provide the 313 engines of the 0–4–2 type. Moreover, the Great Western Railway is responsible for more than half of the 2–4–0 engines in service, there being no fewer than 123 such engines on that line, nearly all of the class which has had so wonderful a record and which has deservedly earned the title of "wonderful little engines." The situation is further emphasised when it is mentioned that the next highest total is no more than 20, on the North Staffordshire Railway, followed by 15 on the London and North Western Railway, and 12 on the Dublin and South Eastern.




THE LONDON AND SOUTH WESTERN RAILWAY HAS 82 4–4–2 TANK ENGINES: TOTAL FOR TYPE 497.

possess more than 100 such engines. On the other hand, the Cambrian has only 6, the Glasgow and South Western 15, Great Northern of Ireland 1, Great North of Scotland 9, Great Southern and Western 16, Highland 6, Maryport and Carlisle 1, Midland Great Western 17 (the whole tank engine stock), and the Taff Vale 14 of this type.

Although the 0–4–2 and 2–4–0 types are certainly disappearing ones, it is a sign of the times that 1915 recorded no diminution of the latter and an addition of one to the former, due, however, to the acquisition by the Great North of Scotland Railway of four small engines for dock and similar duties at Aberdeen. Neither class nor aggregate totals

Furthermore, the Great Western also takes the lead in regard to the 0–4–2 type, of 155 engines out of a total of 313; but in this case the London, Brighton and South Coast claims a premier place, seeing that a record of 112 engines of this type is a far greater proportion of the total stock of 440 tank engines. The locomotives in question are, of course, the well-known "D" tank engines designed by the late Mr. Stroudley, and which are found all over the Brighton system doing work of a high class character, despite their now advancing age and moderate dimensions. Otherwise the only notable total is that of 20 engines of the 0–4–2 type on the London and North

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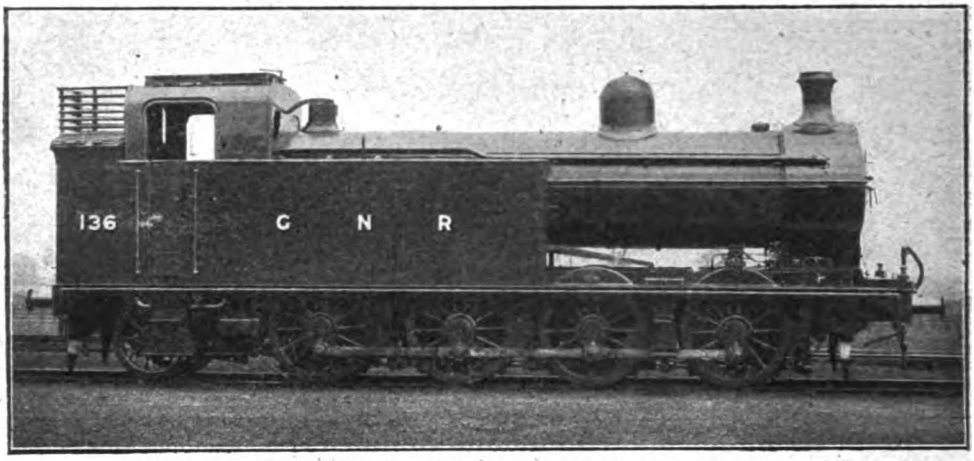
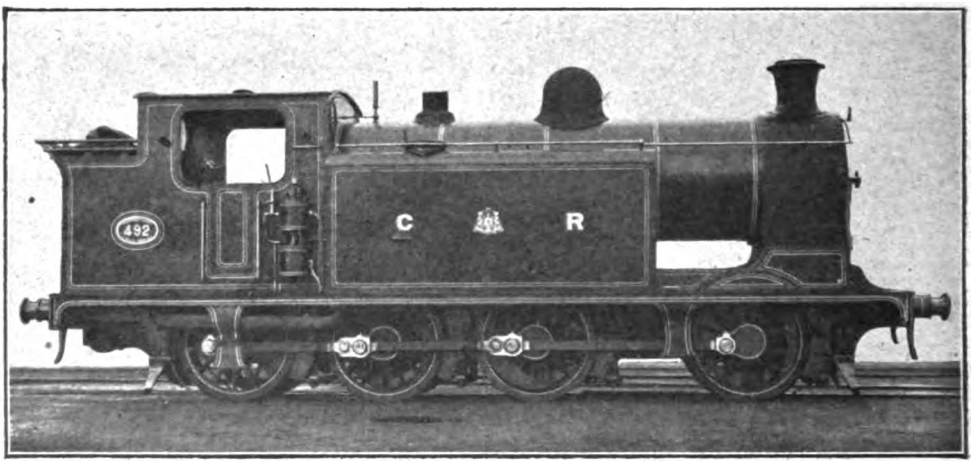
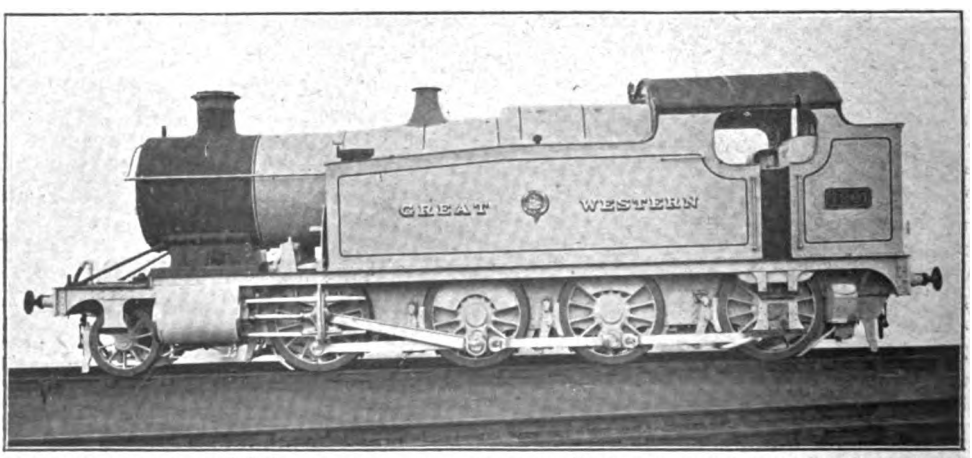



0-8-2 TANK ENGINE GREAT NORTHERN RAILWAY.
This class were originally fitted with condensing apparatus and worked in the London district. They are now used for mineral traffic in the Nottinghamshire and Yorkshire districts. Two, one of which is illustrated, have been fitted with superheating apparatus.
41 out of 78 0-8-2 tank engines are owned by the Great Northern Railway.




OF A TOTAL OF EIGHT 0-8-0 TANK ENGINES, SIX BELONG TO THE CALEDONIAN RAILWAY.




THE WHOLE STOCK OF 2-8-0 TANK ENGINES CONSISTS OF 41 OF THIS TYPE, GREAT WESTERN RLY.

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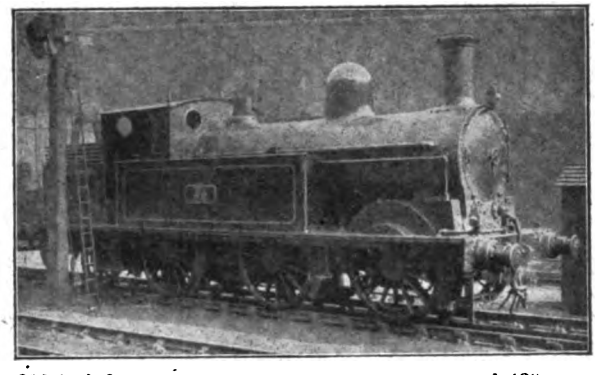
Western Railway, these being mainly crane engines or small coupled-wheelbase engines used in the Liverpool district for special duties.

Dealing now with eight-wheeled engines, five types call for consideration, 2–4–2, 4–4–0, 0–4–4, 0–6–2 and 0–8–0. The 0–6–2 is the most used, realising a total of 1,430 engines. Moreover, there were 17 additional engines of this class during 1915, bearing witness to the favour of this useful type, which may be considered as the legitimate development of the 0–6–0 type for goods and shunting duties, combined with wide usefulness for general traffic. Now that Mr. Peter Drummond has added this type on the Glasgow and South Western Railway, no fewer than 25 lines use 0–6–2 engines, and five of them require three figures to express the total in service. The highest is the London and North Western, 380, where it is a characteristic type, though neither Mr. C. J. Bowen Cooke, nor his predecessor, the late Mr. G. Whale, added to the large stock introduced by Mr. F. W. Webb. The Great Central follows with 208, the Taff Vale has no fewer than 163 of its total of 188 tank engines, the London, Brighton and South Coast has 134 of these engines, and the North Eastern has 102. On the Rhymney and Barry Railways the totals of this type are respectively 82 and 72.



380 0–6–2 TANK ENGINES, OF A TYPE TOTAL OF 1,430, ARE OWNED BY THE LONDON AND NORTH WESTERN RAILWAY.

Until recently the 0–4–4 type bade fair to become almost universal for passenger duties, but it only aggregates 1,238 engines, on 22 lines. The highest total is provided by the Midland Railway with 231 engines, but the London and South Western and South Eastern and Chatham Railways closely follow with 215 and 213 respectively. Other important totals are 183 on the North Eastern Railway and 137 on the Caledonian.

The 4–4–0 class is essentially a type of the past, and while 14 lines provide its total of 184 representatives, no fewer than six have only 1, 2 or 3 such engines. It is hardly necessary to mention that the North London Railway provides the largest number of such engines—77—followed by the North British with 33. Other interesting figures are 16 on the Caledonian, and 13 each on the Great Northern of Ireland and Metropolitan Railways. The 5 on the Cambrian and 1 on the Neath and Brecon are, however, old Metropolitan engines, while the London and North Western's record of 3 is due to taking over some of the old North London engines. A few other old Metropolitan engines are also to be found on small lines which cannot be discussed in detail, while the Metropolitan District Railway still uses two of its old steam engines for depôt and ballast train duties.

The 2–4–2 type is essentially one of the Lancashire and Yorkshire Railway, where there are 332 in service, but on the London and North Western, where it was once so characteristic, there are still 258 of these engines, and the Great Eastern follows well up with 235 of this type. Eighteen railways provide the grand total for the type of 1,044 engines, but after the lines mentioned in detail the highest total is of 60 engines, on the North Eastern Railway.

All of these types, except the 0–6–2, may be termed types of the past, though the 0–4–4 still holds considerable favour, and the 2–4–2 is by on means finished yet in regard to new construction; but the 0–8–0 is essentially a type of the present, and yet it has only eight representatives. Of these six are on the Caledonian, with one on the Great Central—acquired, it is understood, with the Wrexham, Mold and Connah's Quay Railway—and one on the Kent and East Sussex Railway, to whom it was supplied some years ago by Messrs. Hawthorn, Leslie & Co., for special duties. Certainly not an ambitious record for a "modern" type, but partly explained by the fact that greater bunker and tank capacity is usually required for such powerful engines, hence the preference for 2–8–0 and 0–8–2 engines, if eight-coupled wheels are to be employed at all.

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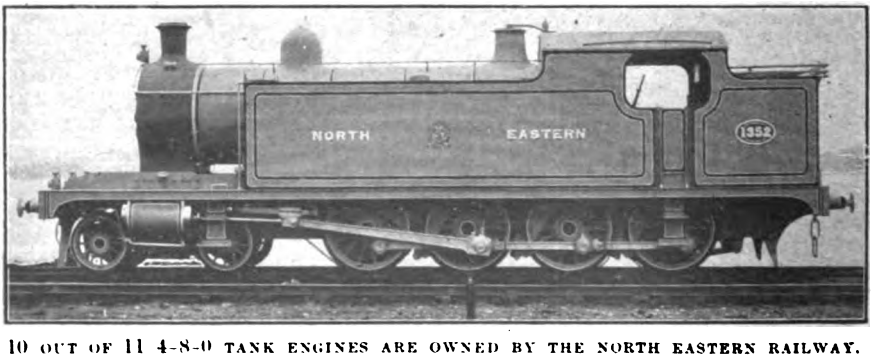
20 OUT OF A TOTAL OF 27 4-4-4 TANK ENGINES ARE IN USE ON THE NORTH EASTERN RAILWAY.

In a special category must be placed the three Fairlie (0-4-4-0) engines on the Festiniog Railway, and four 2-2-4 engines for inspection duties on the North Eastern Railway.

Dealing now with ten-wheeled types, five wheel arrangements call for reference, but only three as yet provide large numbers of representatives. The most usual is the now well-known 4-4-2 type, of which there are no fewer than 497 in service on 18 lines. Moreover, the distribution is more equitable than in any other case, for there are totals of from 50 to 82 on six lines, and 31 and 35 respectively on two other lines. The Brecon and Merthyr has only one such engine, also the Wirral, but the Furness is increasing its total of 2 to 4. The latter figure is found also on the Dublin and South Eastern Railway, where some interesting engines of the class are in service. The figures for this type are of interest, and may appropriately be given in full, in descending order, as follows:

| | |
|---|---|
| London and South Western | 82 |
| Midland (L.T. & S. Section) | 70 |
| London, Brighton and South Coast | 62 |
| Great Northern | 60 |
| Great Central | 52 |
| London and North Western | 50 |
| North British | 35 |
| Great Western | 31 |
| Great Southern and Western | 14 |
| Belfast and County Down | 12 |
| North Staffordshire | 7 |
| Taff Vale | 6 |
| Great Northern of Ireland | 5 |
| Dublin and South Eastern | 4 |
| Cork, Bandon and South Coast | 3 |
| Furness | 2 |
| Brecon and Merthyr | 1 |
| Wirral | 1 |

Of these classes it is somewhat remarkable that the London and South Western total consists only of old engines, the well-known 4-4-2 engines first introduced by Mr. Adams in the 'seventies, while some of the "Tilbury" engines date back almost as far, though there are also modern engines among the 70 noted. The Great Southern and Western, Great Northern, Great Central, Belfast and County Down, Taff Vale, Great Northern of Ireland, Brecon and Merthyr, and Wirral, with the Cork, Bandon engines also date back several years. The North British, Furness and North Staffordshire engines are about the latest in regard to dates of first introduction.




10 OUT OF 11 4-8-0 TANK ENGINES ARE OWNED BY THE NORTH EASTERN RAILWAY.

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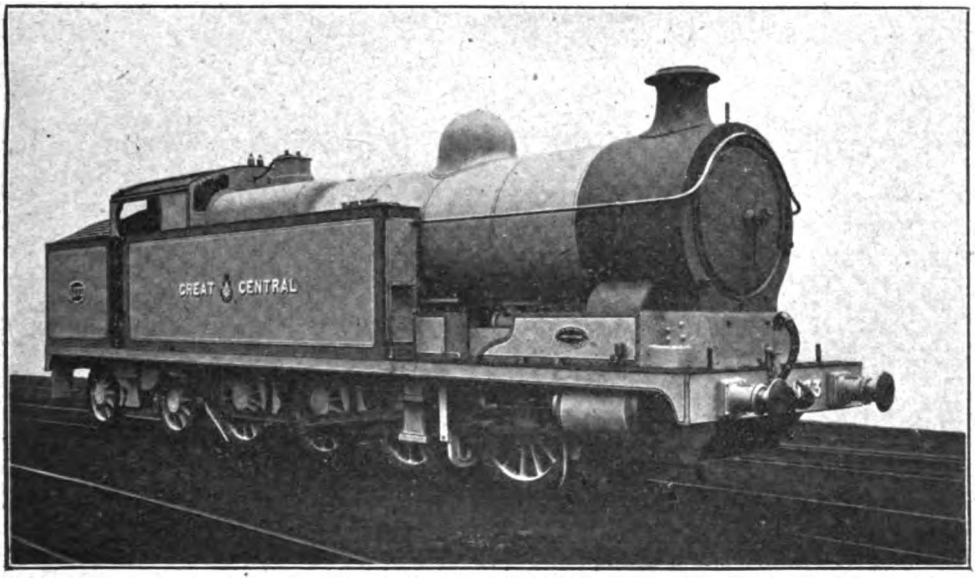
The Brighton list includes both the 5 ft. 6 in. and 6 ft. 7 in. classes, the latter being the well known express class, while the Great Western engines are also for express work, with large coupled wheels 6 ft. 8 in. diameter. The North Western engines are for general duties, though they perform a good deal of fast work, notwithstanding their 5 ft. 6 in. wheels.

The next most numerous ten-wheeled type is the 2–6–2, but it is employed by only four railways, and of the total of 196 engines no fewer than 167 are Great Western, including both large and small wheeled outside cylinder classes, and the rebuilt inside cylinder engines employed principally in the Birmingham district. There are also the 20 Hoy engines on the Lancashire and Yorkshire Railway. The seven on the Alexandra Docks Railway are old Mersey engines, while the two on the Cambrian Railways are the narrow-gauge classes used on the Vale of Rheidol section.

The next most numerous class is the 0–6–4, of which there are now 100 representatives on 13 lines. It is usually a development of the 0–6–2 type with larger bunker capacity, or alternatively of the 0–4–4 type with six-coupled wheels, but is generally a considerably more powerful engine, and the type has become mainly a passenger one, though the engines are also useful for goods traffic when required. The Midland heads the list with 40 engines of the 2000 class, used largely for local passenger traffic in the Birmingham and Manchester areas, where really heavy suburban trains are worked over difficult routes, but several are engaged in goods traffic on the Tilbury section.

The Barry Railway comes next with 10 engines, and there are nine on the Great Central, these being originally Lancashire, Derbyshire and East Coast locomotives. Both the Highland and the North Staffordshire have eight of these engines, while the Great Southern and Western Railway of Ireland has seven, these being almost the oldest engines of the type in service. The South Eastern and Chatham has five, the Great Northern of Ireland four, and the Alexandra Docks three (old Mersey Railway engines). On the Great Western there are two of this type, understood to be crane locomotives employed at Swindon, and the Wirral also has two of these engines. Statistics for 1915 show only one on the Metropolitan, but now there are four on that line, this being the latest design of this type. Finally, the Cavan and Leitrim has one such engine.




THE GREAT CENTRAL RAILWAY HAS FOUR THREE-CYLINDER 0–8–4 ENGINES, THESE BEING THE ONLY ONES OF THE TYPE.

The 4–6–0 type is still a very unusual one, though there are still 16 of these engines. There were 10 more, but the North Eastern engines of the type have been converted to 4–6–2. Otherwise all the engines of this type are found on Irish narrow-gauge railways,

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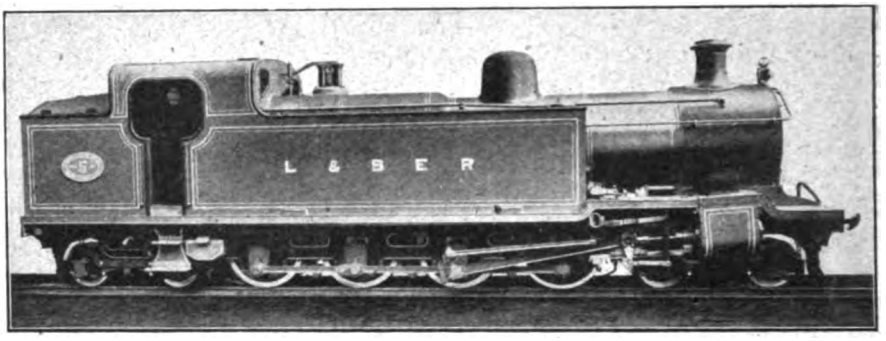


THE LONDONDERRY AND LOUGH SWILLY RAILWAY (LETTERKENNY AND BURTONPORT EXTENSION) IS THE ONLY ONE USING 4-8-4 TANK ENGINES (NARROW GAUGE).

the Cork and Macroom and County Donegal having six each, and the Londonderry and Lough Swilly four.

Remaining ten-wheeled types are the 0–8–2 and 2–8–0. The latter is confined to 41 engines, all on the Great Western Railway, but the former is found on five railways, though of the total of 78 engines, the Great Northern has no fewer than 41, the once well-known suburban passenger engines, but now used for goods traffic in the Leeds and Doncaster areas. The London and North Western comes next with 20 engines, the Barry has seven, while there are five each on the Great Western (understood to be Port Talbot engines) and Lancashire and Yorkshire Railways.

Of twelve-wheeled engines the only familiar type at present is the 4–6–2; which now totals 93 engines on five railways. The London and North Western leads with 37 engines, but is closely followed by the North Eastern with 30, these including the conversions from the 4–6–0 type already referred to. There are 16 of these engines on the Great Central Railway, eight on the Londonderry and Lough Swilly (narrow-gauge), and the well-known two on the Brighton line, No. 325 *Abergavenny*, and No. 326 *Bessborough*.

The 4–4–4 type is not a common one, but there are 27 engines, though Mr. Worsdell's three-cylinder class on the North Eastern Railway accounts for 20 of these. Otherwise the Wirral has three, and the Midland and South Western Junction and County Donegal Railways two each.

Remaining twelve-wheeled engines are of special types. The Great Central has 10 of the 2–6–4 type, besides which there are eight on the County Donegal line and two on the Leek and Manifold Light Railway. Of the 4–8–0 type there are 10 on the North Eastern Railway, and one in Ireland, Mr. Watson's big shunting engine for the Great Southern and Western Railway. The Great Central is responsible, with its big Wath three-cylinder shunting engines, for the only 0–8–4 locomotives in the United Kingdom, there being four of these engines.

With 14 wheels there is only one type at present calling for consideration, the 4–6–4, with 14 representatives. Eight of these are on the Tilbury section of the Midland Railway, two on the London, Brighton and South Coast (No. 327 *Charles C. Macrae* and No. 328), and four on the County Donegal Railway. There remains only one other class for reference, the 4–8–4 tank engines used on the Londonderry and Lough Swilly Railway, of which two are in service.

Finally, a few general remarks in reference to the distribution of these types. Although 26 wheel arrangements are covered, the highest total on any one railway is 12, on the Great Central and Great Western Railways, and quite a number of lines have only a very small selection. The Midland Great Western of Ireland is unique in that with as many as 17 tank engines, only one type is represented, but the Stratford-upon-Avon and Midland Junction is in a similar position, as it has only one tank engine. It is surprising, however, how many have five, six, or more types, and the following statement will be of interest:

*Great Central* (0–4–0, 2–4–0, 2–4–2, 0–4–4, 4–4–2, 0–6–0, 0–6–2, 4–6–2, 0–6–4, 0–8–0, 2–6–4, 0–8–4) .. 12

*Great Western* (0–4–0, 2–4–0, 0–4–2, 2–4–2, 0–6–0, 4–4–0, 4–4–2, 0–6–2, 2–6–2, 0–6–4, 0–8–2, 2–8–0) .. 12

*London and North Western* (0–4–0, 2–4–0, 0–4–2, 2–4–2, 4–4–0, 4–4–2, 0–6–0, 0–6–2, 4–6–2, 0–8–2) .. 10

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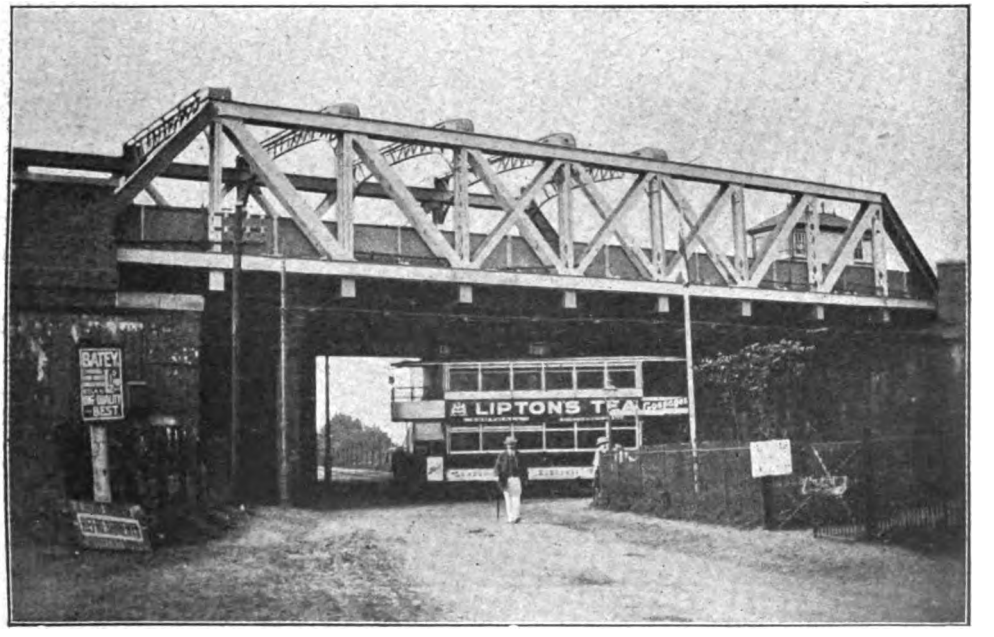
| | |
|---|---|
| *North Eastern* (0-4-0, 2-4-2, 0-4-4, 4-4-4, 0-6-0, 0-6-2, 4-6-2, 4-8-0, 2-2-4) .. .. .. .. | 9 |
| *Great Southern and Western* (0-4-0, 0-4-2, 2-4-2, 0-4-4, 4-4-2, 0-6-0, 0-6-2, 0-6-4, 4-8-0) .. .. | 9 |
| *Lancashire and Yorkshire* (0-4-0, 2-4-0, 2-4-2, 0-4-4, 0-6-0, 0-6-2, 2-6-2, 0-8-2) .. .. .. .. | 8 |
| *Caledonian* (0-4-0, 0-4-2, 2-4-2, 4-4-0, 0-4-4, 0-6-0, 0-8-0) .. .. | 7 |
| *Great Northern of Ireland* (0-4-0, 2-4-2, 4-4-0, 4-4-2, 0-6-0, 0-6-2, 0-6-4) .. .. .. .. | 7 |
| *London, Brighton and South Coast* (0-4-2, 0-4-4, 0-6-2, 0-6-0, 4-4-2, 4-6-2, 4-6-4) .. .. .. .. | 7 |
| *Midland* (0-4-0, 0-4-4, 0-6-0, 0-6-2, 4-4-2, 0-6-4, 4-6-4) .. .. | 7 |
| *North Staffordshire* (2-4-0, 2-4-2, 0-4-4, 0-6-0, 4-4-2, 0-6-2, 0-6-4) .. | 7 |

The Alexandra Docks, Barry, Cambrian, Dublin and South Eastern, Great Northern, London and South Western, Metropolitan, and North British Railways have six types in use; and the Cork, Bandon and South Coast, County Donegal, Furness, Great Eastern, Highland, Isle of Wight Central, Taff Vale and Wirral Railways have five each. Of the bigger lines with four or fewer types only it is interesting to note the inclusion of the Glasgow and South Western (4), Great North of Scotland (4), North London (2), Rhymney (3), and South Eastern and Chatham (4).

## "A LITTLE KNOWN BRUNEL MASTERPIECE."

### SKEW BRIDGE BETWEEN HANWELL AND SOUTHALL, GREAT WESTERN RAILWAY.




*Photo]* [*F. H. Stingemore.*

Two roads cross under the bridge, one the main road from Shepherd's Bush to Uxbridge, the other a bye-road from Osterley Park to Greenford. The electric car is standing on the former road, while the view is taken looking along the latter. The main road passes behind the telegraph pole and the brick pier of the bridge, at an acute angle under the railway.

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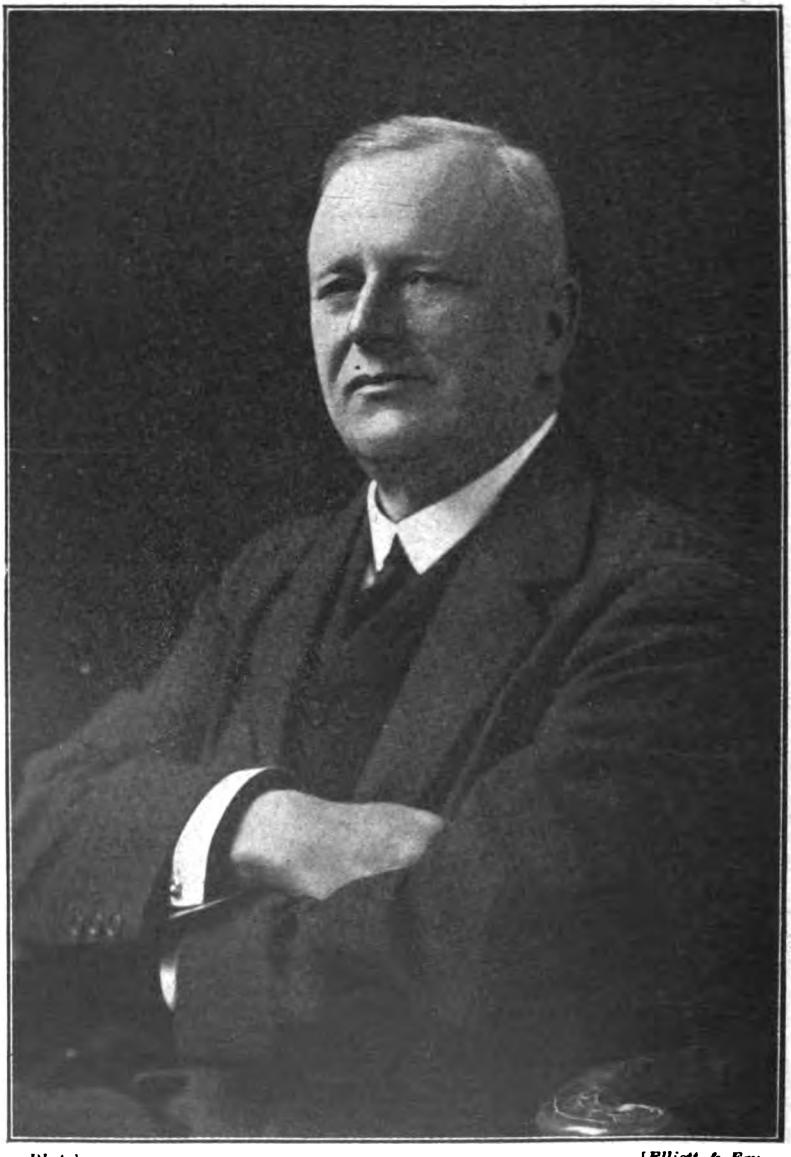
# THE RAILWAY PORTRAIT GALLERY.



*Photo]* *[Elliott & Fry.*

**SIR GILBERT H. CLAUGHTON, Bart.,**

**Chairman,**

**London and North Western Railway.**



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# The Railway Portrait Gallery.

## SIR GILBERT H. CLAUGHTON, BART.

### Chairman, London and North Western Railway.

ALTHOUGH it was not until the death of Lord Stalbridge that Mr. Gilbert Claughton, as he then was, came to the fore as one of the great leaders of the railway world, he had been one of the Deputy-Chairmen of the Company for some time previously, and a Director for a number of years, while in the "Black Country" his name was already a famous one in industrial and commercial circles. But it is mainly since he took over the onerous duties associated with the chief position on the Board of the "Premier Railway," that "Sir Gilbert Claughton, Bart.," has become a power in the land, while since the outbreak of war it would be difficult to set forth the numerous and varied services which he has rendered to the Government and to the nation as a whole.

Sir Gilbert Claughton is the youngest son of the late Bishop of St. Albans. Born at Kidderminster in 1856, and educated at Exmouth and Eton, he served three years' apprenticeship at Messrs. Beyer, Peacock & Co.'s Works in Manchester, afterwards studying at King's College, London. He then accepted a position on the Dudley Estate, and for 25 years acted as Lord Dudley's chief agent. During this period the new Steel Works at Round Oak (Iron and Steel Works, Ltd.) were erected, together with the proving of the thick coal west of the Staffordshire Boundary Fault, now worked by a modern colliery (Baggeridge, Ltd), of which he is Chairman. Sir Gilbert is also connected with several other local industries. and is a Director of Barclay's Bank. He unsuccessfully contested the seat for Dudley in 1906, but although he never entered Parliament, he was four times Mayor of Dudley, of which town he was given the freedom. He is now an Alderman of the Staffordshire County Council, and until recently was Chairman of the Finance Committee. Other activities include a seat on the Council of the Iron and Steel Institute, while during the war period Sir Gilbert has been called upon by the Government to serve on the Industrial Committee, British Dyes, Ltd., the Retrenchment Committee, the Food Committee, and on a committee to consider the Position of Science in Education.

It was in 1905 that Sir Gilbert Claughton first joined the Board of the London and North Western Railway, and he became Chairman in 1911. The honour of a baronetcy was conferred upon him by His Majesty the King in 1912.

As an indication of the popularity enjoyed by Sir Gilbert Claughton, it is interesting to mention that on the occasion of his recovery from a serious illness in December last, the *Railway Review* (this being the official organ of the National Union of Railwaymen) included a very sympathetic reference to the matter in their columns and stated that "the nation can ill afford to lose the services of its eminent men, even temporarily, in these anxious times."

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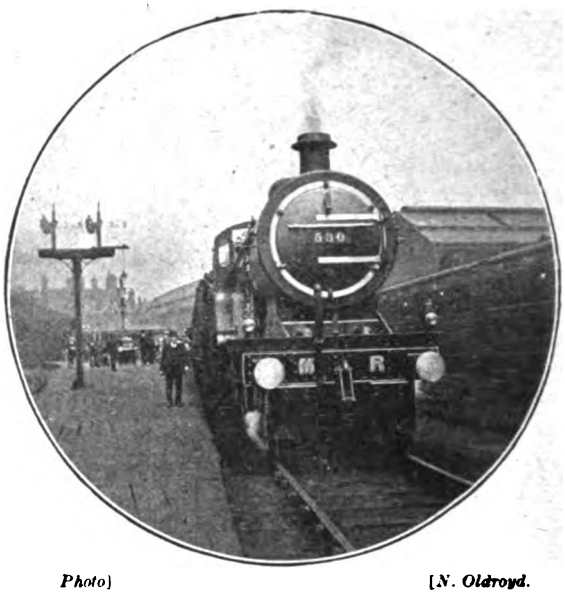
# British Locomotive Practice and Performance.

By CECIL J. ALLEN.



*Photo*] [*N. Oldroyd.*

MIDLAND RAILWAY.

2.50 p.m. Bristol express at Leeds (Wellington).

I AM reminded of my omissions by the letter of a close friend, who addresses me thus: "Now when *are* you going to give us some more G.W.R.? I have just had three Great Western runs. One on the up 'Limited' was disappointing until Reading. We left Exeter at 1.47.40 to-day with *Knight of the Garter* hauling twelve 70 ft. 8-wheelers, including tea-car, *crammed* throughout. I make the empty weight 404 tons. Our highest speed to Whiteball was 56 m.p.h., and our lowest 36; down the bank the highest speed was 78 m.p.h. The extraordinary part of the run was 33 min. 41 sec. from Reading, passed at 38 m.p.h., to the dead stop at Paddington. It is this kind of thing which makes me say what I do about the G.W.R. Here you have a driver who discovers at Reading that he is making a poor run, and lifts a load of 404 tons off the mark in this kind of way, just humming into Paddington dead stop in nearly 3½ min. under his booked time for the last 36 miles. His mile-post times were:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 36 | m.p. | pass | 4.14.35 | 17 | m.p. | pass | 4.32.16 |
| 35 | ,, | ,, | 15.52 | 16 | ,, | ,, | 33.06 |
| 34 | ,, | ,, | 17.05 | 15 | ,, | ,, | 33.58 |
| 33 | ,, | ,, | 18.12 | 14 | ,, | ,, | 34.50 |
| 32 | ,, | ,, | 19.15 | 13 | ,, | ,, | 35.42 |
| 31 | ,, | ,, | 20.15 | 12 | ,, | ,, | 36.35 |
| 30 | ,, | ,, | 21.13 | 11 | ,, | ,, | 37.27 |
| 29 | ,, | ,, | 22.09 | 10 | ,, | ,, | 38.20 |
| 28 | ,, | ,, | 23.03 | 9 | ,, | ,, | 39.12 |
| 27 | ,, | ,, | 23.55 | 8 | ,, | ,, | 40.03 |
| 26 | ,, | ,, | 24.47 | 7 | ,, | ,, | 40.53 |
| 25 | m.p. | pass | 25.38 | 6 | m.p. | pass | 41.44 |
| 24 | ,, | ,, | 26.29 | 5 | ,, | ,, | 42.35 |
| 23 | ,, | ,, | 27.19 | 4 | ,, | ,, | 43.27 |
| 22 | ,, | ,, | 28.08 | 3 | ,, | ,, | 44.19 |
| 21 | ,, | ,, | 28.58 | 2 | ,, | ,, | 45.15 |
| 20 | ,, | ,, | 29.47 | 1¼ | ,, | ,, | 45.30 |
| 19 | ,, | ,, | 30.37 | Paddington | | ar. | 4.48.16 |
| 18 | ,, | ,, | 31.26 | | | | |

"Here are the passing times:—

| Miles. | | | Schedule. p.m. | Actual. p.m. |
|---|---|---|---|---|
| 0·0 | Exeter .. | dep. | 1.45 | 1.47.40 |
| 20·0 | Whiteball .. | pass | 2.08 | 2.15.10 |
| 30·8 | Taunton .. | ,, | 2.17½ | 2.24.29 |
| 35·8 | Cogload Junc. | ,, | 2.22½ | 2.29.42 |
| 58·3 | Castle Cary .. | ,, | 2.46½ | 2.51.52 |
| 65·1 | M.P. 122¾ .. | ,, | 2.54½ | 3.00.03 |
| 78·1 | Westbury .. | ,, | 3.08½ | 3.15.08 |
| 103·6 | Savernake .. | ,, | 3.33½ | 3.43.23 |
| 120·6 | Newbury .. | ,, | 3.50 | 3.58.15 |
| 137·7 | Reading .. | ,, | 4.08 | 4.14.35 |
| 155·3 | Slough .. | ,, | 4.25 | 4.31.35 |
| 173·7 | Paddington .. | arr. | 4.45 | 4.48.16 |

"And here is another splendid run which I had a few Saturdays ago on the 11.5 a.m. *ex*-Paddington, due at Bristol at 1.5 p.m. The load was six 70 ft. cars, one restaurant car and three clerestories, which I made 313 tons unloaded. The train was packed, and one could hardly move. I was not able to get the name of the engine or the driver, but I could see that it was a 4-cylinder 4–6–0. We left at 11.5 dead, and after feeling our way out through rain and fog got stopped dead at Southall for 29 sec. in the station, starting away at 11.19.14 a.m. We were doing 61 m.p.h. at mile-post 14, less than 5 miles away. Speed then increased



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till we were doing nearly 70 m.p.h. at Slough, and high speed was maintained throughout the run. Near Dauntsey we did 3 miles at 78 m.p.h., and after Box several miles at 75. Here is the log :—

| Miles. | | | Schedule: a.m. | Actual. a.m. |
|---|---|---|---|---|
| 0·0 | Paddington .. | dep. | 11.05 | 11.05.00 |
| 9·1 | Southall | arr. | pass | 11.18.45 |
| | | dep. | 11.16 | 11.19.14 |
| 18·4 | Slough .. | pass | 11.25 | 11.31.15 |
| 36·0 | Reading .. | ,, | 11.42 | 11.46.27 |
| 53·1 | Didcot .. | ,, | 11.58½ | 12.01.41 |
| 77·3 | Swindon .. | ,, | 12.22 | 12.24.33 |
| 94·0 | Chippenham .. | ,, | 12.38 | 12.38.49 |
| 103·9 | Bath, slip .. | arr. | †12.50 | *12.51.21 |

† Train passes. * Arrival of slip portion.

Thus the 97 miles 63 chains from Southall to Bath were run start-to-stop in 92 min. 7 sec., and the 75 miles 41 chains from Slough to Chippenham, passing in each case, in 68 min. 34 sec. I hope you will be able to reproduce these two runs, or at any rate this one and part of the other, and to give us some more G.W.R. soon. There is really no running like theirs ! They ought to have four articles a year ! ! "

My friend, whom readers by now will probably have recognised as the ardent apologist who figured in these columns earlier in the year, seems to continue to be singularly fortunate in his runs. My experiences on the Great Western Railway of recent months—as indeed on every other line—have been varied in character, but some of them are certainly well worthy of attention. I will commence with two on the 1.5 p.m. *ex*-Paddington, which until the commencement of the new year was timed to cover the 117·6 miles to Bristol, *viâ* Badminton, in 120 min. On the first occasion our engine was a 2-cylinder 4–6–0, No. 2908, *Lady of Quality*, and the load six 70 ft. 8-wheelers, including dining car, and one 60 ft. coach, 229 tons empty, and 240 tons with passengers and luggage. As will be seen from the tabular details of the run in column 1, there was a remarkable absence of checks of any sort, and with no ultra-energetic running, Badminton, 100 miles, was passed in 98¾ min.—¼ min. before time. We were running at 66 m.p.h. when we passed Slough, and speed then fluctuated to 64 at Maidenhead, 71·4 at Reading, 60·6 at Cholsey, 64·3 at Didcot, and 66 again at Shrivenham. After slacking to 36 m.p.h. at Wootton Bassett we touched 68 at Little Somerford, and then went up the 1 in 300 to Badminton with no lower rate than 57 m.p.h. Through Sodbury Tunnel, however, a very bad permanent way check was in force, while subsequent delays included adverse signals at Ashley Hill and a stop at Laurence Hill, so that thereby we lost 6 min., reaching Bristol exactly 5 min. behind time.

A week or two later, on the same train, our engine was similarly a 2-cylinder 4–6–0, No. 2951, *Tawstock Court*, and the load seven 8-wheelers, but partly of lighter stock, totalling 210 tons empty and 220 tons full. This run figures in column 2. Load and road considered, the running was inclined to be poor, speed all the way to Swindon scarcely rising at any point above the mile-a-minute rate. A little better work was done beyond, with a maximum of 68 m.p.h. at Somerford, and no lower rate than 57·7 at Badminton ; the 17·1 miles from Wootton Bassett to Badminton took 17 min. 25 sec., and the remaining 17·6 miles into Bristol 20 min. exactly. The latter involved a gain of one min. on schedule, but the train was still 5 min. 40 sec. late on arrival, a clear 3 min. having been dropped by the engine.

In the reverse direction I have had three far finer journeys on the 5.5 p.m. from Bristol to London. The first of these runs, behind No. 2909, *Lady of Provence* (2-cylinder 4–6–0), was described in the April, 1914, issue of the RAILWAY MAGAZINE ; the two latter, on one of which equally fine work was performed, took place more recently. Our engine on the second occasion, shown in column 5, was one of the original 2-cylinder " Atlantics " converted to 4–6–0—No. 2983, *Redgauntlet*—and the load seven 70 ft. 8-wheelers, including diner, and one 60 ft. vehicle, all elliptical stock. This totalled 262 tons empty, and 275 tons with passengers and luggage. There was a very high south-westerly wind blowing throughout the journey, but this was in our favour save only from Bristol to Filton, Brinkworth to Wootton Bassett, and Didcot to Reading, where we felt it strongly owing to the change in direction of the line. An excellent start was made, speed rising to 45 m.p.h. on the gentle ascent to Stapleton Road, and not falling below 33·3 on the 2¼ miles climb at 1 in 75 which follows. On the 1 in 300 up beyond Winterbourne we accelerated to 52·9 m.p.h., and further to 54·2 at Sodbury, although the passage of Sodbury Tunnel brought us down to 51 at Badminton. On the 1 in 300 descent past Hullavington we touched 77·5 m.p.h., and so were through Wootton Bassett, where we slacked carefully, in 40 min. 40 sec (34·7 miles).

After this we did magnificently to Didcot,



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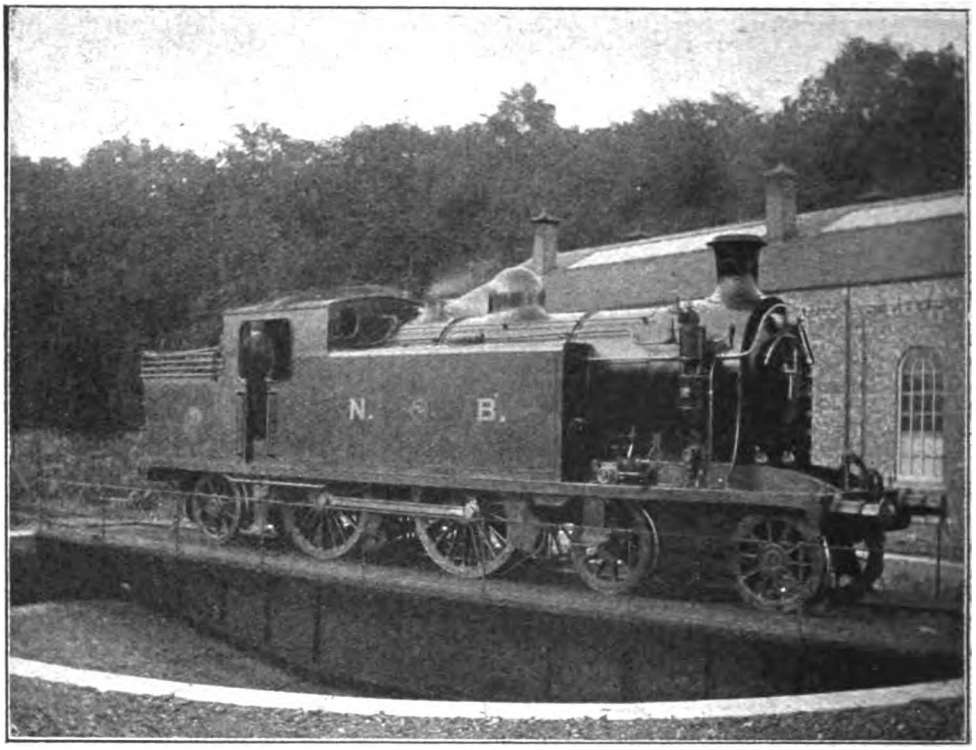


*Photo]* [*W. F. Anderson.*

NORTH BRITISH RAILWAY.

New 4-4-2 tank engine (Robinson superheater) No. 448 on turntable at Galashiels.

speed recovering rapidly to 64 m.p.h. at Swindon, and increasing to 70 at Shrivenham, 72·5 at Uffington and 74 at Wantage Road—on a fractionally falling grade of 1 in 754. Despite this fine work, however, we had not done more than keep time, the aggregate of 67½ min. for the 64·5 miles from Bristol to Didcot being exactly as booked. Now, as previously mentioned, the wind caught us badly, and the speed fell to 60 m.p.h. beyond Goring, while the long and severe slack through Reading further hampered our times, the 17·1 miles from Didcot to Reading taking 17½ min. Relieved of the slip coach, however, and with load reduced to 240 tons, we again went ahead on a level track, reaching 67 m.p.h. at Taplow, 72·5 at Maidenhead and 75 at Slough. Thenceforward the engine was decidedly eased, and we passed Southall, 108·5 miles from the start, in 109¾ min., and Acton, 113·3 miles, in 114 min. 5 sec., with every prospect of a punctual arrival. But this was not to be, signals at Westbourne Park delaying us so that we reached Paddington 3 min. behind time. Undelayed, we should probably have completed the 117·6 miles' journey in a fraction under the 120 min. allowed, despite the easy running from Slough, but on this particular train, which follows the Badminton route with its stiff initial rise to Filton Junction, and has the severe Reading slack thrown in, even bare time-keeping involves exceptional work. Indeed, I always regard the 5.5 p.m. from Temple Meads to London as the hardest to work of the four 2-hour expresses.

The third journey was not quite so good; it is shown in column 6. *Tawstock Court*, No. 2951—which figured in run 2—was again the engine, with a load of nine 8-wheelers, totalling 276 tare tons to Reading and 241 tons beyond, or 295 and 260 tons gross respectively, as the train was packed from end to end. We just managed to sustain a 30 m.p.h. rate up to Filton—30·2 m.p.h. was the minimum speed to be precise—but there were very severely slacked, a signal check at Stoke Gifford Junction being added to the service slack.

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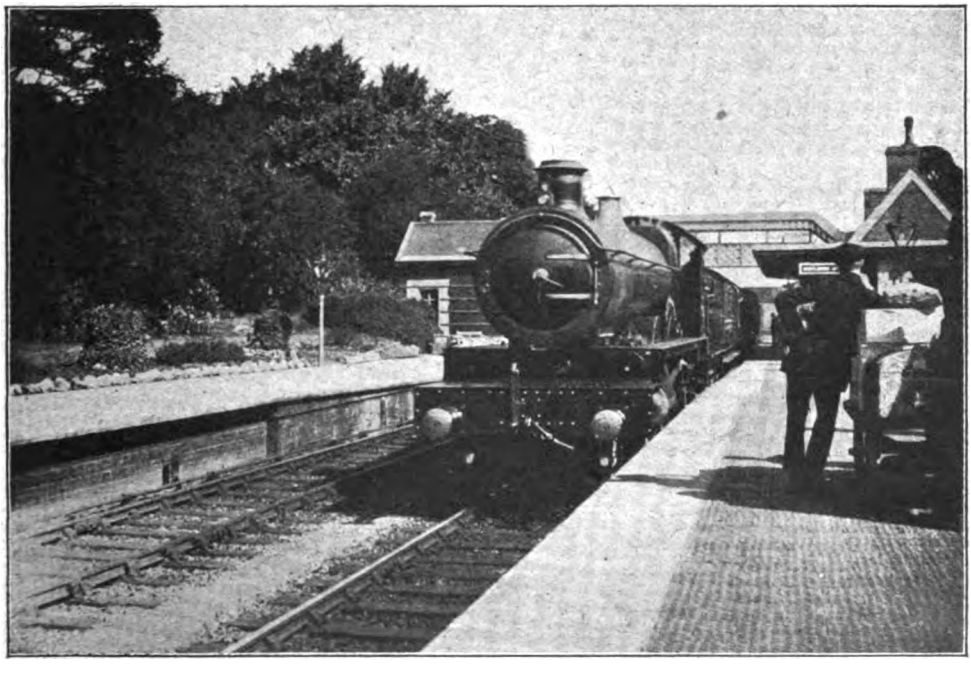
However, we recovered to a steady 52·9 m.p.h. up the 1 in 300 to Sodbury Tunnel, and only lost 1 min. 25 sec. on the sharp booking out to Badminton. Descending to Somerford a top speed of 75 m.p.h. was reached, but progress beyond Wootton Bassett was arrested by an exceedingly bad check through Swindon yard, which brought us down to 10 m.p.h. for some distance. From this we recovered slowly, passing Shrivenham at 64·3 m.p.h., Uffington at 71·4, Challow at 72·5, and Wantage Road at 73·8 m.p.h.—our top speed. Beyond Didcot, which we passed 3½ min. behind time, the speed fell gradually until we were doing 62·5 m.p.h. at Tilehurst, immediately after which steam was shut off for Reading. After Reading, which was passed at a decidedly higher speed than usual, the work fell off very perceptibly. We were not able to get up anywhere a higher speed than 62·5 m.p.h. on the tempting stretch from Twyford to Actor, taking 2½ min. longer between these points than did *Redgauntlet*, and despite a clear road into Paddington we dropped 5 min. exactly between Bristol and London, about 1 or 1½ min. of which must be debited against the engine, and could easily have been retrieved east of Reading.

A run may be mentioned here on the 4.15 p.m. from Paddington to Bath, which was inclined to partake of the nature of the "curate's egg," and which I have not tabulated. This express is booked to cover the 106·9 miles to Bath in 111 min., and on the occasion of this run the main portion of the train consisted entirely of 70 ft. stock, including dining car, together with a 60 ft. slip coach for Chippenham—10 vehicles in all, totalling empty 329 tons. But the gross weight was fully 350 tons, as the train was crammed in every part—indeed, I had the doubtful pleasure of standing all the way to Bath—and the engine was yet again a 2-cylinder 4-6-0, No. 2920, *Saint David*. We started in a leisurely fashion, passing Hanwell, 7·4 miles, in 11½ min., and then encountered a bad relaying check at Southall. Recovering slowly, we had attained 63·8 m.p.h. at Slough, but beyond Twyford the speed fell to 56·3. Further delay occurred at



*Photo]* [*F. H. Stingemore.*

GREAT WESTERN RAILWAY.

Bristol-Exeter stopping train at Wellington.

4-6-0 engine No 2983, *Red Gauntlet.*

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| Distance (mls.) | Run No. .. .. .. .. / Engine 4-6-0 No. .. .. / Name .. .. .. .. / Load (axles) .. .. .. / „ (tons empty) .. .. / „ (tons full) .. .. .. | | Schedule (min.) | 1 *2908 *Lady of Quality* 28 229 240 | 2 *2951 *Tawstock Court* 28 210 220 | Schedule (min.) | 3 †4000 *North Star* 24 207 215 | 4 †4003 *Lode Star* 28 228 240 | Distance (mls.) | Schedule (min.) | 5 *2983 *Red-gauntlet* 32 260 275 | 6 *2951 *Tawstock Court* 36 276 295 | Distance (mls.) | Schedule (min.) | *l* †4000 *North Star* 40 321 335 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M. S. | M. S. | | M. S. | M. S. | | | M. S. | M. S. | | | M. S. |
| 0·0 | Paddington .. .. | dep. | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 117·6 | 120 | 123.00 | 125.00 | 133·4 | 152 | 156.20 |
| | | | | | | | | | | | *p* | | | | |
| 9·1 | Southall .. .. | pass | 11 | 12.35 | 12.30 | 12 | 12.55 | 13.20 | 108·5 | 109 | 109.45 | 114.25 | 124·3 | 141 | 145.20 |
| 18·4 | Slough .. .. | „ | 20 | 21.30 | 21.50 | 22 | 22.40 | 22.40 | 99·2 | 100 | 101.25 | 105.25 | 115·0 | 133 | 136.05 |
| 24·2 | Maidenhead .. .. | „ | 25¼ | 26.55 | 27.30 | 28 | 28.15 | 28.15 | 93·4 | 94 | 96.35 | 99.50 | 109·2 | 126 | 130.45 |
| 31·0 | Twyford .. .. | „ | 31½ | 33.05 | 34.05 | 35 | 35.05 | 34.50 | 86·6 | 88 | 90.50 | 93.25 | 102·4 | 119 | 124.30 |
| 36·0 | Reading .. .. | arr. | pass | pass | pass | 41 | 40.35 | 40.30 | — | slip | slip | slip | — | pass | pass |
| | | dep. | 37 | 37.20 | 39.35 | 43 | 43.40 | 44.05 | 81·6 | 83½ | 85.00 | 87.25 | 97·4 | 114 | 119.40 |
| 44·7 | Goring .. .. .. | pass | — | 45.20 | 45.05 | — | 54.40 | 55.25 | 72·9 | — | 75.20 | 78.35 | 88·7 | — | 111.30 |
| 53·1 | Didcot .. .. .. | „ | 53½ | 53.20 | 56.15 | 63 | 63.00 | 63.10 | 64·5 | 67½ | 67.30 | 71.00 | 80 3 | 97½ | 101.10 |
| | | | | | *d* | | | | | | | | | | *n* |
| 60·4 | Wantage Road .. | „ | — | 60.10 | 64.15 | — | 70.45 | 70.20 | 57·2 | — | 61.20 | 65.10 | 73·0 | — | 88.10 |
| 71·5 | Shrivenham .. .. | „ | — | 70.30 | 76.45 | — | 82.55 | 81.00 | 46·1 | — | 51.55 | 55.25 | 61·9 | — | 77.25 |
| 77·3 | Swindon .. .. | „ | 77 | 75.40 | 82.25 | 87 | 89.10 | 86.25 | 40·3 | 45½ | 46.40 | 47.45 | 56·1 | 74 | 71.35 |
| | | | | | | | | | | | | *m* | | | |
| 82·9 | Wootton Bassett .. | „ | — | 81.05 | 88.15 | — | 95.05 | 91.25 | 34·7 | — | 40.40 | 41.20 | 50·5 | — | 64.40 |
| 89·7 | Little Somerford .. | „ | — | 88.25 | 95.25 | — | 102.10 | 98.20 | 27·9 | — | 34.05 | 34.35 | 43·7 | — | 57.40 |
| 100·0 | Badminton .. .. | „ | 99 | 98.45 | 105.40 | 110 | 112.50 | 108.40 | 17·6 | 24 | 25.00 | 25.25 | 33·4 | 49 | 48.00 |
| | | | | *a* | | | | | | | | | | | |
| 104·4 | Sodbury .. .. | „ | — | 106.55 | 110.05 | — | 117.10 | 113.05 | 13·2 | — | 19.40 | 20.30 | 29·0 | — | |
| 109·8 | Winterbourne .. .. | „ | — | 111.50 | 115.00 | — | 121.40 | 117.50 | 7·8 | — | 13.35 | 14.35 | 23·6 | — | |
| | | | | | | | | | | | | *l* | | | |
| 112·8 | Filton Junction .. | „ | 112½ | 115.30 | 118.30 | | | | 4·8 | 9 | 9.40 | 10.25 | | | |
| | | | | *b* | | | | | | | | | | | |
| 116·0 | Stapleton Road .. | „ | — | 119.55 | 122.25 | | | | 1·6 | 4 | 4.25 | 4.30 | | | |
| | | | | *c* | | | | | | | | | | | |
| 117·6 | Bristol .. .. .. | arr. | 120 | 125.00 | 125.40 | | | | 0·0 | 0 | 0.00 | 0.00 | | | |
| | | | | | | | *e* | | | | | | | | |
| 113·1 | Patchway .. .. | pass | | | | 124 | 126.05 | 121.45 | | | | | 20·3 | 39 | 31.00 |
| 118·1 | Severn Tunnel E. .. | „ | | | | — | 131.40 | 127.35 | | | | | 15·3 | — | 21.05 |
| | | | | | | | *f* | *g* | | | | | | | |
| 123·6 | „ „ Jc. .. | „ | | | | 138 | 142.35 | 136.30 | | | | | 9·8 | 12 | 13.25 |
| | | | | | | | | *h* | | | | | | | |
| 133·4 | Newport .. .. | arr. | | | | 150 | 154.05 | 150.35 | | | | | 0·0 | 0 | ¶0.00 |
| — | Net time (min.) .. | | 120 | 119 | 122¾ | ‖107 | ‖107 | ‖102¾ | — | 120 | 120 | 122 | — | 152 | 147¼ |

* 2-cylinder engine; † 4-cylinder engine; ‖ Reading to Newport; ¶ Starting time from Malndee West Junction, ¼ mile east of Newport station; *a* prolonged permanent way check, Sodbury Tunnel; *b* signals, Ashley Hill; *c* signal stop, Laurence Hill; *d* severe permanent way check, Wantage Road; *e* signal check, Stoke Gifford; *f* permanent way check, very severe, Severn Tunnel; *g* permanent way check, Severn Tunnel; *h* severe signal check, Magor, and permanent way check, Usk Bridge; *l* slight signal check, Stoke Gifford; *m* signal check, Swindon Yard; *n* dead stop, signals, Foxhall Junction; *p* signal stop, Wormwood Scrubbs.



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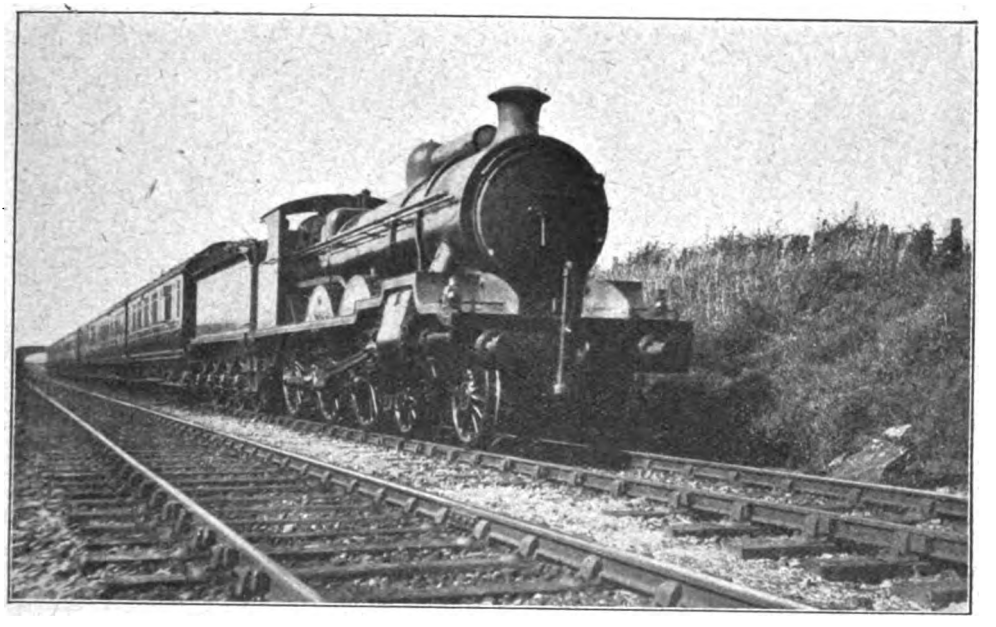
Reading by our being switched across to the slow lines through the station, and then on to the fast lines again. This stage of the journey had consumed altogether 43 min. 25 sec. A welcome improvement now set in, speed rising to 66 m.p.h. at Didcot, and continuing almost exactly at that figure to well beyond Shrivenham, on a gradual rise averaging 1 in 750. So we passed Didcot in 62 min. and Swindon in 84¼ min. from London, and thus to cover the 24·2 miles from Didcot to Swindon in 22¼ min. with 350 tons behind the tender was a fine piece of work. Now, however, *Saint David* "tired" very perceptibly, falling to 57·7 m.p.h. on the level stretch before Wootton Bassett, only touching a maximum of 70·3 at Dauntsey bank, and actually dropping to 47·4 on the 7 miles at 1 in 660 up that which precede the Box Tunnel. And this as compared with a sustained 66 m.p.h. on a much longer 1 in 750 grade! By passing Chippenham, 94 miles, in 100½ min. from London we had only lost 3½ min. on schedule time—more than accounted for by the early delay—but with such running we should in any case have lost another minute to Bath. As it was, we were stopped by signals at Bathampton, and arrived 12 min. 35 sec. late. The net time was about as booked, schedule time having been kept exactly from Slough to Chippenham, inclusive of the slack at Reading. But the sluggish start and finish more than nullified the 3½ min. gain between Didcot and Chippenham.

On the South Wales service I have had three runs, of which I will take two down journeys first, shown respectively in columns 3 and 4. They were on the 8.45 a.m. express *ex*-Paddington, which for the present terminates at Carmarthen. Our engine was the pioneer 4-cylinder "Atlantic"—No. 4000, *North Star*—now converted to 4–6–0, and the load six 70 ft. 8-wheelers, with restaurant car, 203 tons empty and 210 tons full. We started very moderately, taking 12 min. 55 sec. to Southall, 22 min. 44 sec. to Slough, and 40 min. 35 sec. to Reading stop—a mild performance on a level road with this light load. But little improvement was shown after Reading beyond a smart start to Pangbourne, the 5·5 miles taking 7 min. 40 sec.; thenceforward the speed just touched 60 m.p.h. at Goring, and failed to reach that figure again all the way on to Swindon. Even on the favourable grades beyond Wootton Bassett (where we slacked to 45 m.p.h.) nothing higher than 66 m.p.h. was reached.



*Photo*] [*I. Cheyne.*

GLASGOW AND SOUTH WESTERN RAILWAY.

St. Pancras–St. Enoch express near Stewarton.
4–6–0 engine No. 129, fitted with Weir feedwater heater and Schmidt superheater.

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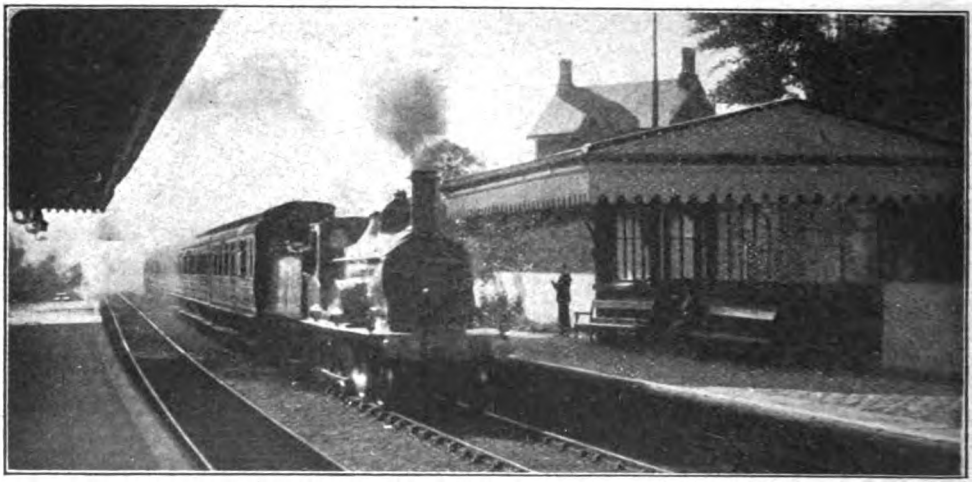
A tardy effort was made beyond Sodbury, with a speed of 74 miles on the 1 in 300 descent to Winterbourne, but signals at Patchway and permanent way repairs in the Severn Tunnel combined to make us 4 min. 5 sec. late on arrival at Newport, the 97¼ miles from Reading having taken 110 min. 25 sec. Net time from Reading to Newport was about as booked.

But the second journey was an altogether finer one, despite a heavier load, the engine being again a "Star"—No. 4003, *Lode Star*. The train consisted of seven 8-wheelers, all but one of which were 70 ft. stock, weighing empty 228 tons, and with passengers and luggage 240 tons. A leisurely start was made to Reading—the easy schedule, indeed, invites nothing else—the highest speed, at Slough, being only 64·3 m.p.h., and we started on the second stage a minute behind time. From Reading, again, we did not start so rapidly as on the previous run, but after Goring the driver set to work in first-class style, touching 66·1 m.p.h. at Cholsey and 67 at Didcot. Then, after a brief lapse to 59·2 m.p.h. at Steventon, we sustained a rate of 62·5 past Wantage Road, 65·2 past Uffington, and, later, 69·2 m.p.h. between Swindon and Wootton Bassett. Slacking carefully through the latter junction, we touched 70·3 m.p.h. at Somerford, and went up the 1 in 300 thence to Badminton at a steady 56·3, afterwards taking the descent to Winterbourne quite easily with a maximum rate of only 66 m.p.h. Here we achieved "even time" from Reading, inclusive of Wootton Bassett slack, this 73·8 miles having taken 73¾ min. Incidentally, also, we gained on schedule 3 min. 20 sec. between Reading and Patchway, after negotiating very slowly and carefully the curve from Stoke Gifford. After this we went very moderately down to the Severn Tunnel, in the middle of which, also, a bad relaying slack was encountered. There was still, however, ample time left for a punctual arrival at Newport, when we passed Severn Tunnel Junction, but the fates were unkind, and a bad signal check at Magor, followed by a very severe slowing over the Usk Bridge at Newport, disposed of our chances, although even then we were only 35 sec. late. Thus we had covered the 97·4 miles from Reading in 106½ min.—½ min. under schedule—while the net time of 102½ min. evidenced excellent locomotive work.



*Photo]* [*L. C. King Wilkinson.*

MIDLAND RAILWAY.

Liverpool and Manchester–Scottish express passing Chatburn.
4–4–0 engine No. 308 (unrebuilt).

A rather unsuccessful journey on the 8.30 p.m. down Fishguard Boat Express may also be mentioned, but is not tabulated. The engine was No. 2952, *Twineham Court*—a 2-cylinder 4-6-0—and the load nine 8-wheelers, and one 12-wheeler, the former including dining and sleeping cars and the latter being a mail van of brobdingnagian proportions. This train totalled 333 tons empty, and 350 tons gross. A violent south-westerly wind hampered the running, catching us head-on for most of the journey, but sideways beyond Reading, Wootton Bassett,

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and Patchway. We took 13½ min. to pass Southall, 23 min. 10 sec. to Slough, 41 min. 20 sec. to Reading, and stopped at Didcot in exactly 60 min. to the second, 3 min. behind time. The stop lasted 4 min., and we left still 3 min. late. From here we took 30½ min. to pass Swindon, 24·2 miles; 55 min. 25 sec. to Badminton, 46·9 miles, and 69 min. 35 sec. to Patchway, 60 miles; after that ensued the same permanent-way check in the Severn Tunnel, and we reached Newport 15 min. 10 sec. late.

Most of my up journeys from South Wales were made *viâ* Bristol, but on one occasion I tried the 1.48 p.m. direct non-stop express from Newport, booked through to London, 133·4 miles, in 152 min. No. 4000, *North Star*, was again the engine, with a load of 321 tons empty, 335 tons full. The run appears in column 7. We were stopped at Maindee West Junction, from which I take my times and distances, and left there 12 min. after our booked departure time at Newport. The start to Severn Tunnel Junction was good, this initial length of 9·4 miles being covered in 13 min. 25 sec., but we came very moderately up from the tunnel, speed falling on the continuous 1 in 100 ascent to 24·2 m.p.h. So the first 19·9 miles to Patchway consumed 31 min. of journey time. The next 13·1 miles of gentle ascent to Badminton occupied 17 min., and here our speed had risen to 50 m.p.h., followed shortly by an acceleration to 75 on the falling grades to Somerford. So we got through Wootton Bassett, 50·1 miles from the start, in 64 min. 40 sec., and Swindon, 55·7 miles, in 71 min. 35 sec. Thenceforward we ran very fairly, accelerating gradually to 65 m.p.h. at Steventon, but, unfortunately, we were stopped dead by signals at Foxhall Junction, Didcot, for 3½ min., having covered the 79·3 miles from Maindee in 95 min. Restarting, we covered the 53·7 miles into Paddington, without further delay, in 57 min. 50 sec., speed rising to 68 m.p.h. at Goring, falling to 64·3 at Reading, and rising again to 66 at Slough, but despite this we arrived 16 min. 20 sec. late. The net running time from Newport to London was about 147½ min., this involving an economy of 4½ min. on schedule.

A melancholy reminder of the Birmingham 2-hour trains—only temporarily, one trusts, decelerated—is furnished by a journey on the tightly-timed 9.10 a.m. express from Paddington to the North. Our engine was No. 4023, *King George*, a 4-cylinder 4–6–0, and the net load 291½ tons to Princes Risborough, 263 to Banbury, 235 to Leamington, and 186½ tons through to Birmingham, or about 305, 275, 245 and 195 tons gross respectively. The ten 8-wheeled vehicles at the start were reduced by the three successive slips to six beyond Leamington; the restaurant car was the only 70 ft. coach on the train. I have timed better work to Wycombe than we did on this occasion; the highest speed at Ruislip was exactly 60 m.p.h., and we fell to 52·9 on Gerrard's Cross bank, so that even a spurt at 71·4 down to Wycombe could not prevent a loss of 1 min. 20 sec. on this initial stretch, the time for the 26·6 miles being 32 min. 20 sec. The present booked time to Wycombe, by the way, is as much as 34 min. A further 2 min. were lost by our having to draw up twice at Wycombe, and thus we left 3 min. 20 sec. late, but a steady ascent of Saunderton bank was made, speed continuing at 43 m.p.h. on the 1 in 164, and Princes Risborough was passed in 12 min. 20 sec. from Wycombe (8·1 miles). After this we did magnificently. A maximum rate of 85 m.p.h. was touched past Haddenham, and after slacking to 60 at Ashendon Junction, we reached 72·5 at Blackthorn before dropping to 52·3 m.p.h. on the long 1 in 200 ascent to Ardley Tunnel. At Aynho Junction we slacked again to 60 (after touching 70·3 m.p.h. past Aynho Park), and the mile-a-minute rate was then maintained on the rising grades beyond Banbury, increasing to 75 m.p.h. beyond Fenny Compton, and 80·3 in the descent of Southam Road bank. In virtue of this remarkable work we gained 3 min. 10 sec. from Risborough to Leamington, covering this 52½ miles in 48 min. 10 sec. Mile-post 105, 59·7 miles from Wycombe, was passed in 59 min., and Leamington, 60·8 miles, in 60½ min., despite the very fair load, and the intermediate vertical rise of 525 ft. Intermediate times were: Risborough to Ashendon, 9·4 miles, 7¼ min.; Ashendon to Bicester, 9·3 miles, 8 min. 50 sec.; Bicester to Banbury, 14·1 miles, 14 min. 5 sec.; and Banbury to Leamington, 19·9 miles, 18 min. 10 sec. The recovery from Leamington slack (25 m.p.h.) was not quite so good as the work preceding it, and speed fell to 40 m.p.h. on Hatton bank, the 6·1 miles from Leamington to Hatton taking 8 min. 25 sec.; and the 13·9 miles thence to Tyseley 13¾ min. After that the Bordesley widening works delayed us badly, and we arrived nearly 4 min. late. Deducting the overtime spent at Wycombe and the cost of the last delay, however, the engine had lost nothing on schedule time,

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and had put up some very creditable running. The actual time from Wycombe to Birmingham, 84·0 miles, was 88½ min., and the net time about 86¼ min., against a booking of 89 min.

An interesting comparison with this run is furnished by a journey timed by a friend on the same train, with one vehicle less, making a load of 275 tons to Risborough, 245 to Banbury, 215 to Leamington and 160 tons to Birmingham. The engine was again a 4-cylinder 4-6-0, No. 4033, *Queen Victoria*. A rather better start was made, Northolt Junction, 10·3 miles, being passed in 14 min. 10 sec., Beaconsfield, 21·7 miles, in 26 min., while High Wycombe, 26·6 miles, was reached in 31 min. 10 sec. A maximum rate of 63·4 m.p.h. was attained at Denham, speed afterwards falling to 51·7 on the 1 in 175, but increasing to 54·7 m.p.h. on the easier grades to Beaconsfield, while a top speed of 72·5 an hour was touched before Wycombe. Restarting after a stop of 1 min. 50 sec., a rate of 41·6 m.p.h. was sustained on the 1 in 164 of Saunderton bank, and Princes Risborough was passed in 12 min. exactly. Thenceforward speed was comparatively moderate, nothing higher than 77·5 m.p.h. being touched past Haddenham, so that the 18·7 miles from Risborough to Bicester took 17 min. 5 sec. The lowest rate up Ardley bank was, as in the last journey, 52·3 m.p.h., while the highest on the descent to Aynho was a modest 64·3, and the 14·1 miles from Bicester to Banbury occupied 13 min. 50 sec., while the 19·9 miles on to Leamington, still under easy steam, took 18¼ min. Leamington was passed slowly in 61 min. 10 sec. from Wycombe. By Warwick a speed of 55·6 m.p.h. had been regained, and with the greatly reduced load nothing lower than 49·5 m.p.h. was touched on Hatton bank, the 6·1 miles from Leamington to Hatton thus occupying 7 min. 25 sec. On the slightly falling grades beyond a rate of 72·5 m.p.h. was maintained, the 12·9 miles from Hatton to Acock's Green taking only 11 min. 50 sec., and despite the same bad delays from this point to Moor Street, Birmingham was reached in 87 min. 10 sec. (about 85¾ min. net) from Wycombe, and 120 min. 10 sec. from Paddington—quite an excellent performance.

Another run, from the same source, requires less comment, the train being the non-stop 11.5 a.m. down, on the old timing, with an unusually light load of eight 8-wheelers only—260 tons gross to Leamington, and 200 tons thence to Birmingham. No. 4057, *Princess Elizabeth*, a 4-cylinder 4-6-0, was the engine. At the start things were taken very easily, speed not even rising above 59·2 m.p.h. at Denham, and falling to 53·4 on Gerrard's Cross bank, although a

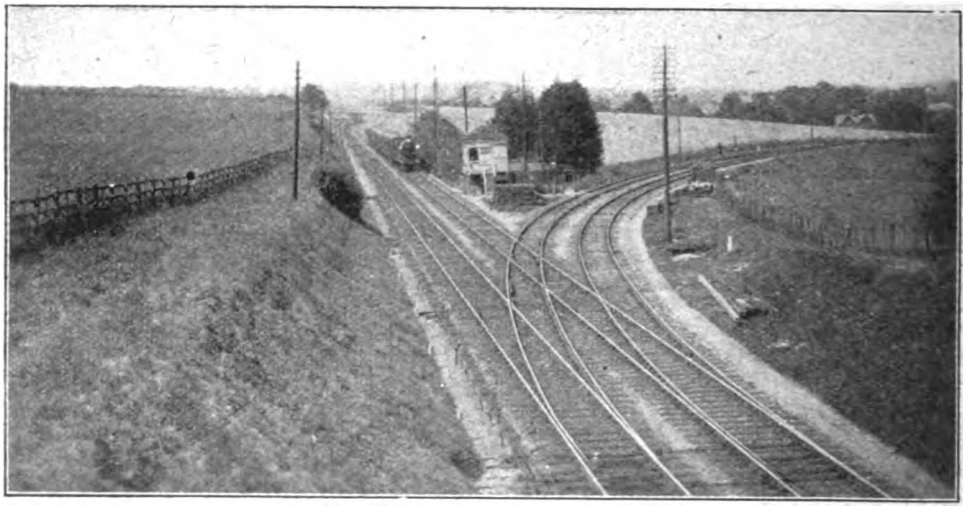

*Photo.* [*L. C. King Wilkinson.*

LONDON AND SOUTH WESTERN RAILWAY.

Junction with Didcot, Newbury and Southampton Railway south of Winchester. Weymouth express approaching.

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rate of 73·7 m.p.h. was attained before Wycombe, which was passed slowly in 31 min. 20 sec. from the start. Up Saunderton bank 46·8 m.p.h. was maintained, Risborough being passed 41¼ min. after leaving Paddington, 34·7 miles. Matters now improved, as a top speed of 77·5 m.p.h. was reached down Haddenham bank, and then, after the usual Ashendon Junction slack, a further and unusual maximum of 73·7 m.p.h. at Brill, so that the 18·7 miles from Risborough to Bicester were covered in 17 min. Further, the sustained minimum at Ardley Tunnel was 54·2 m.p.h., but that was the conclusion of anything special in the way of effort, as the time from Bicester to Banbury was 14 min. 25 sec., and from Banbury to Leamington exactly 20 min., the latter in particular indicating very easy going. Further easy running ensued thence to Birmingham, the final 23·2 miles from Leamington taking 27 min. 35 sec., with a minimum speed of 41·6 m.p.h. up Hatton bank, and a maximum of 66·1 at Tyseley, after which came permanent way cautions. The total time from London to Birmingham was therefore 120¼ min., or about 117½ min. net. I have not had the heart to time a Birmingham express since the recent decelerations, but shall possess my soul in patience until, as may reasonably be expected, the 2-hour service is once more reinstated.

I will next quote a run from a friend, whose records I know to be compiled with the greatest care, on the 4.11 p.m. non-stop summer express from Taunton to London—a train on which I once timed one of the finest runs that I have ever experienced in this country. But my friend's load was not within "hailing distance" of mine, the total on his run, with passengers and luggage, being only a modest 325 tons, against my 530 tons. The engine was a 4-cylinder 4-6-0, No. 4054, *Princess Charlotte*, and the weather fine, with a moderate north wind, but what the atmospheric conditions contributed to the success of the run was more than outweighed by a whole string of permanent way delays. The latter began even before Cogload Junction had been passed with a check to 30 m.p.h., after a speed of 61 m.p.h. had been attained. So the initial 5·0 miles to Cogload took 7¾ min. But some good work was done between Cogload and Castle Cary, this length of 22·5 miles taking only 22 min. 5 sec. instead of the 24 min. allowed. The highest speeds here were 69 m.p.h. at Athelney, and 72 beyond Keinton Mandeville, with a minimum of 56 m.p.h. at Somerton. From Castle Cary up to "mile-post 122¾"—the only mile-post in existence, I suppose, that is dignified with passing times—the 6·8 miles took 7 min. 39 sec., with a minimum rate of 43 m.p.h., but the ensuing descent to Frome was spoilt at its conclusion by a reduction of speed from 71 to 10 m.p.h. for a second permanent way caution to and through Frome, and so this 7·2 miles' length occupied 7 min. 16 sec. From Frome to Westbury, where the usual slack was made, the 5·8 miles took 8 min. 9 sec., and, despite the two delays, over a minute had been regained of the 7 min. arrears at starting.

Some exceedingly fine work now followed from Westbury to Savernake. On the very faintly rising 10 miles to Lavington a maximum rate of 67 m.p.h. was attained, followed by a minimum of 54 m.p.h. on the 6 ascending miles at 1 in 222 to Patney. The 1½ miles downhill at 1 in 300-380 before Pewsey produced a maximum rate of 65 m.p.h., and *Princess Charlotte* then went up the final 6 miles' ascent to Savernake, including, at the finish, 1¾ miles at 1 in 240, and ¾ at 1 in 153, with no lower rate than 57 m.p.h.—an exceedingly fine achievement. So the 25·5 miles from Westbury to Savernake, with a rising tendency throughout, took only 26 min. 46 sec. After this came the third permanent way check, but not a severe one, the 17·0 miles from Savernake to Newbury being covered in 15 min. 13 sec., with a maximum of 72 m.p.h., and the 17·1 miles from Newbury to Reading, where speed was reduced to 35 m.p.h., 15 min. 44 sec. By now 4½ out of the lost 7 min. had been recovered, and with an allowance of 39 min. on to Paddington comparatively easy running sufficed to economise the outstanding 2½ min. Speed rose to 68 m.p.h. at Taplow and fell to 64 at Hayes, rising again to 68 at Ealing, after which a string of checks prevented an absolutely punctual arrival being made. But the 142·9 miles from Taunton to Paddington, allowed 154 min., were covered in an actual time of 148 min. 27 sec., including three permanent way checks and three bad service slacks, or 142¾ min. net, including the latter but not the former. This mile-a-minute average with quite a substantial load reflects great credit on the driver concerned.

As a final *bonne bouche* I am giving some details of a run timed by my correspondent in Burmah, so many of whose interesting journeys, with his comments on them, have figured in these columns from time to time. The particular interest of this log lies in the

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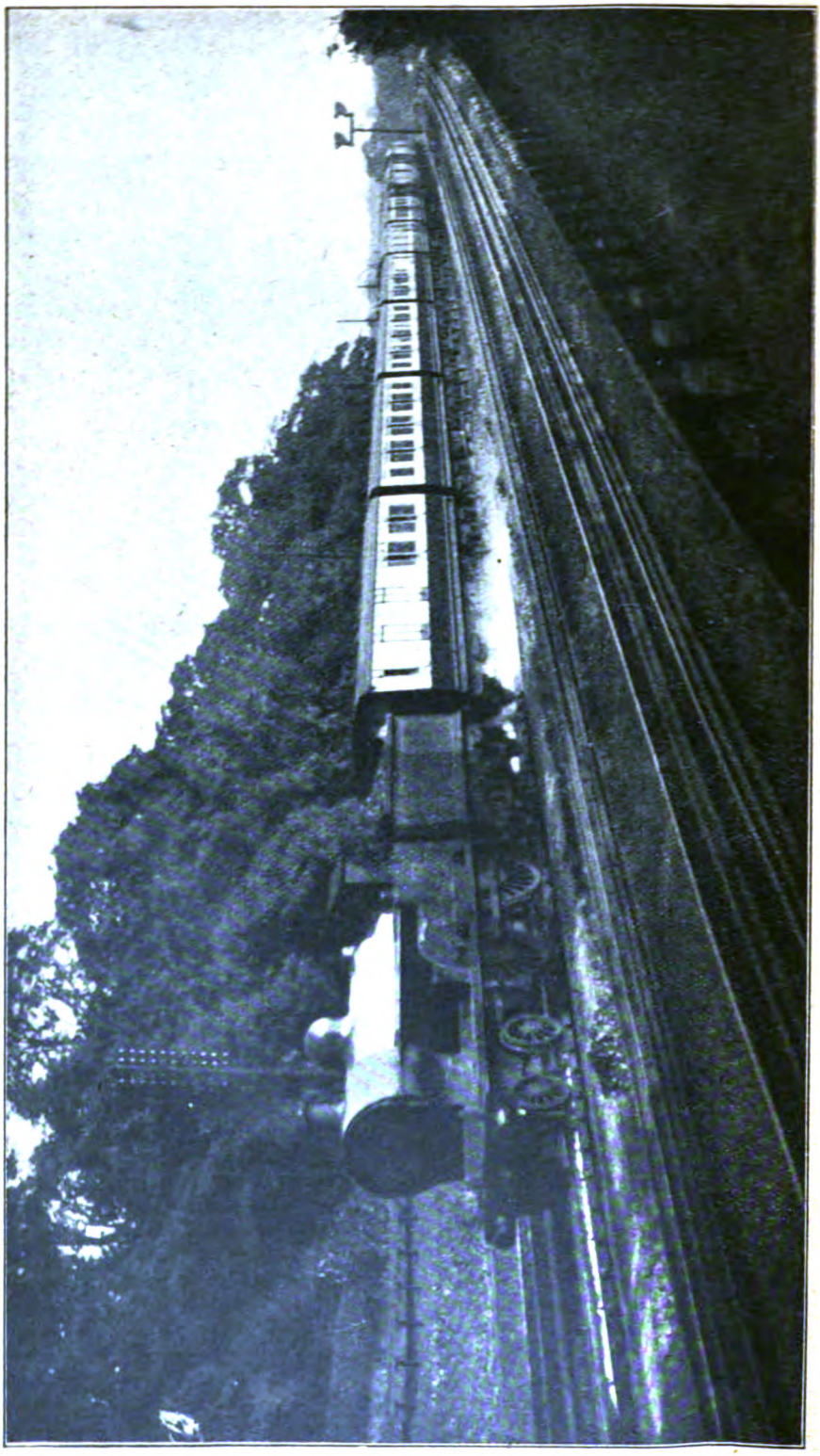

[*H. R. H. Ward.*

LONDON AND NORTH WESTERN RAILWAY.
Down Liverpool and Manchester express near Bushey.
4–4–0 superheater locomotive No. 2495, *Bassett-Hound*.

*Photo.*]

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fact that the train concerned was a special boat express from Plymouth to London, travelling *viâ* Bristol in order to set down passengers there, and running non-stop between Plymouth and Bristol, and Bristol and Paddington *viâ* Badminton, respectively. There was a featherweight load of 142 tons empty, or 150 tons with passengers and luggage, drawn by 4-cylinder 4-6-0 engine No. 4045, *Prince John*. Weather conditions were bad, but not adverse, as the south-westerly gale would be a help for the major part of the journey, although fine rain was falling to Exeter, and the conditions continued showery after that. I give my friend's log just as he sent it to me :—

| Miles. | | Actual Time. | Notes. |
|---|---|---|---|
| 0·0 | Plymouth (Mill Bay) .. .. .. | dep. 11.06.15 | |
| 0·9 | „ (North Road) .. .. .. | pass 11.08.40 | —at 20 m.p.h. (service) |
| 4·9 | Plympton .. .. .. .. .. | „ 11.13.45 | |
| 7·6 | Hemerdon Box .. .. .. .. | „ 11.18.40 | |
| 14·9 | Wrangaton .. .. .. .. .. | „ 11.27.40 | —very cautious running to Totnes |
| 24·0 | Totnes .. .. .. .. .. .. | „ 11.38.00 | —p.w. slack, 3 m.p.h. |
| 28·9 | Dainton Summit .. .. .. .. | „ 11.46.00 | |
| 32·7 | Newton Abbot .. .. .. .. | „ 11.51.20 | —at 20 m.p.h. (service) —bad check and stop, sigs. |
| 37·9 | Teignmouth .. .. .. .. .. | „ 12.01.50 | —slack |
| 40·7 | Dawlish .. .. .. .. .. | „ 12.05.00 | —slack } service |
| 52·0 | Exeter (St. Thomas) .. .. .. .. | „ 12.16.30 | —very slow } slacks |
| 52·9 | „ (St. David's) .. .. .. .. | „ 12.18.20 | —at 20 m.p.h. |
| 56·3 | Stoke Canon .. .. .. .. .. | „ 12.22.50 | |
| 67·7 | Tiverton Junction .. .. .. .. | „ 12.33.30 | |
| 72·8 | Whiteball Summit .. .. .. .. | „ 12.38.35 | |
| 83·7 | Taunton .. .. .. .. .. | „ 12.47.55 | —sigs., at 25 m.p.h. —sigs., 5 m.p.h. |
| 95·2 | Bridgwater .. .. .. .. .. | „ 1. 1.10 | —sigs., 15 m.p.h. |
| 101·5 | Highbridge .. .. .. .. .. | „ 1. 8.25 | |
| 108·2 | Bleadon .. .. .. .. .. | „ 1.14. 0 | |
| 116·5 | Yatton .. .. .. .. .. | „ 1.20.55 | —series of sig. checks |
| 128·5 | Bristol (Temple Meads) .. .. .. | arr. 1.37.10 | |

The following points in connection with this first portion of the log are worthy of note. From North Road, passed very slowly, to Hemerdon Box the time taken was 2 min. less than the start to pass time of the Cornish Riviera express, and from Hemerdon to Totnes, with a very cautious descent, 1 min. 40 sec. less. The average rate from Plympton up to Hemerdon—2·7 miles at 1 in 40-42—was 36·3 m.p.h., but my friend did not note the minimum speed on the climb. From North Road to St. David's, Exeter, the total pass to pass (very slowly in each case) time on this run, despite all delays, only exceeded the start-to-stop time of the "Riviera" by 1 min. 40 sec. Remarkable work, again, was performed from Exeter up to Whiteball, the engine accelerating from a 10 m.p.h. slack to a sustained rate of 66·7 m.p.h. at Stoke Canon, on a gradual rise, and even maintaining the mile-a-minute rate to Burlescombe station, the continuously adverse grades to this point including 1¾ miles at 1 in 154, and, after ¾-mile slightly downhill at Tiverton Junction, 2 miles at 1 in 189 to 258, and 1¼ miles at 1 in 115. The further mile at 1 in 115 from Burlescombe to the summit brought the speed down to 51·4 m.p.h. In the descent of Wellington bank a top speed of 78·9 m.p.h. was touched, but the brakes were then applied for the adverse signals at Taunton, while the subsequent checks at Bridgwater were exceedingly severe. Even then all but 3 min. were gained on the "Riviera" times between Exeter and Taunton. A rate of 71 m.p.h. had been attained between Taunton and Bridgwater, while the average speed on the level from Highbridge to Yatton was 72 m.p.h., but a string of checks on to Bristol caused further delay. All delays included, however, the actual time from Exeter to Bristol—78 min. 50 sec. for the 75½ miles—was 6 min. 10 sec. faster than the fastest booking in regular operation.

My correspondent reckons the cost of the delays as follows. For the dead slow speed through Totnes he makes the modest allowance (even conceding the fact of a regular service slack to 15 m.p.h.) of 1 min., and for the long slack and stop at the 213¼ mile-post, of which 25 sec. was time actually standing, 4 min. The Teignmouth, Dawlish and Starcross slows were regulation cautions. As regards the Bridgwater checks, seeing that the average speed below Taunton was 71 m.p.h., at a continuance of this rate the train would have run from Taunton to Highbridge in 15 min., or say 15½ min., allowing for a slight slack at Taunton (which, in my experience, is very seldom made).

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The actual time taken between these two points was no less than 21 min. 30 sec., so that a loss of 6 min. may be debited to these two checks. In regard to the final checks, my friend makes the assumption that the 71 m.p.h. average might have been continued to a point, say, 3 miles from Bristol, in which case the 9 miles beyond Yatton would have been covered in 7 min. 35 sec. Crediting 4 min. 25 sec. to the last 3 miles into Bristol, we have a total of 12 min. from Yatton, which seems a reasonable allowance. The total loss is therefore 1+4+6+4¼, or 15¼ min. in all. As the total time consumed was actually 150 min. 55 sec., from Mill Bay to Temple Meads, the net time is therefore 135 min. 40 sec. for the 128¼ miles, or 91 min. 35 sec. for the 95½ miles from Newton Abbot to Bristol, inclusive of all its regular speed restrictions.

Continuing from Bristol to London, the log runs as follows, the Badminton route being followed :—

| | | | | |
|---|---|---|---|---|
| 0·0 | Bristol .. .. | dep. | 1.41.10 | —very severe signal check |
| 1·0 | Laurence Hill .. | pass | 1.45.10 | |
| 4·8 | Filton Junction | ,, | 1.51.05 | |
| 9·2 | Coalpit Heath .. | ,, | 1.56.10 | |
| 13·2 | Sodbury .. | ,, | 2.00.00 | —sig., virtual stop |
| 17·6 | Badminton | arr. 2.06.30<br>dep. 2.10.00 | | signal stop |
| 23·2 | Hullavington .. | pass | 2.17.15 | |
| 30·6 | Brinkworth .. | ,, | 2.22.45 | |
| 34·7 | Wootton Bassett | ,, | 2.26.35 | usual service slack |
| 40·3 | Swindon .. | ,, | 2.32.15 | |
| 47·6 | Mile-post 70 .. | ,, | 2.38.50 | |
| 57·6 | ,, 60 .. | ,, | 2.47.00 | |
| 64·5 | Didcot .. .. | ,, | 2.52.40 | |
| 67·6 | Mile-post 50 .. | ,, | 2.55.20 | |
| 77·6 | ,, 40 .. | ,, | 3.03.50 | |
| 81·6 | Reading .. | ,, | 3.07.00 | |
| 87·6 | Mile-post 30 .. | ,, | 3.12.00 | |
| 93·4 | Maidenhead .. | ,, | 3.16.45 | |
| 97·6 | Mile-post 20 .. | ,, | 3.20.30 | |
| 99·2 | Slough .. .. | ,, | 3.21.55 | |
| 107·6 | Mile-post 10 .. | ,, | 3.29.50 | |
| 111·9 | Ealing .. .. | ,, | 3.33.45 | —sig. check |
| 116·4 | Westbourne Park | ,, | 3.38.45 | |
| 117·6 | Paddington .. | arr. | 3.41.20 | |

From this it will be seen that the actual time from Bristol to London was only 120 min. 10 sec., inclusive of a dead stand at Badminton and three other signal checks. Of these the initial check cost 1½ min., and the concluding delay 40 sec., whilst "judging by previous and subsequent averages," my friend continues, "70·3 m.p.h. may be taken as the net speed from Chipping Sodbury to Hullavington, the net time for this 10¼ miles being 8 min. 45 sec." Here, however, I disagree with him. The adverse 1 in 300 grade continues unbroken through Sodbury Tunnel and almost to Badminton station, so that even with this light load, the 4·4 miles between these points would not take less than 4¼ min. at the fastest. Assuming the 5¾ miles from Badminton down to Hullavington to take, say, 5 min., we have a minimum net time from Sodbury to Hullavington of, say, 9¼ min., under favourable conditions. Actual time taken was 17¼ min., which means a loss of 8 min. Add to this the 1½ min. and the 40 sec. previously mentioned, and we have an aggregate loss of 10 min. 10 sec., leaving the net time from Bristol to London, 117·6 miles, 110 min. Add further the net time from Plymouth to Bristol (135 min. 10 sec.) and an aggregate net running time of 245 min. 40 sec. is obtained from Plymouth to London, or under "even time" throughout, inclusive of all the regular slowings.

Some of the work between Badminton and London was very interesting. The actual start-to-stop time between Badminton and Paddington, 100 miles, was 91 min. 20 sec., and the net time 90 min. 40 sec., equivalent to an average of 66·7 m.p.h. Average speed from Hullavington to Brinkworth was 79 m.p.h., and from mile-posts 70 to 20 the speed never fell below 70 m.p.h., but averaged 72 m.p.h. for 50 miles. After that the engine was run under very easy steam from Slough onwards. "Of course the load was a feather-weight for *Prince John*," my correspondent concludes, "and he dawdled over a lot of the journey, but I have never before travelled 50 consecutive miles without dropping below 70 miles an hour, with any load, on any line." But what other line enjoys the privilege, as does the Great Western, of not only 50, but 86 consecutive miles having no steeper grade than 1 in 660, and, indeed, very little of that? Such a perfect course simply *invites* speed records!

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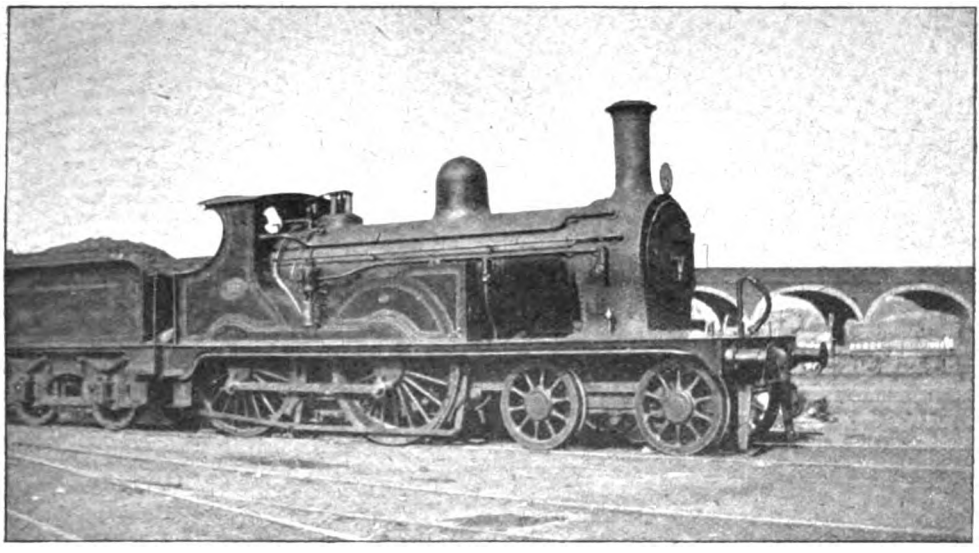

*Photo]* [*H. L. Hopwood.*

4-4-0 EXPRESS LOCOMOTIVE NO. 182.

# The London, Chatham & Dover Railway: An Historical Sketch, 1853–1898.

## [No. II.]

By H. L. HOPWOOD.

(*Continued from page* 284, *October* RAILWAY MAGAZINE.)

THE locomotive works of the London, Chatham and Dover Railway were situated at Longhedge, Battersea. At the end of 1898 the Company owned, according to its published returns, a total of 210 locomotives (not including those on the duplicate list), 1,240 coaching vehicles, and 2,085 wagons, etc., for merchandise traffic. Of the engines, 116 were tender engines and 94 were tank engines. The tabulated list on page 328 gives the leading particulars of all classes running in 1898, some of which are illustrated. Several of the 4–4–0 tender engines were built after the amalgamation in 1899, and in order to make the record complete they have been brought into the table, which, therefore, shows a total of 220 engines, including duplicates.

During the last decade or so of its separate existence the London, Chatham and Dover Railway painted its engines black, but for many years previously they were coloured green, and with their brass dome covers and other brass fittings were at one time amongst the prettiest engines of any railway running into London. Most of them originally carried names.

When the two Companies amalgamated, the London, Chatham and Dover engines had 459 added to their numbers, 459 being the highest number carried by a South Eastern engine; thus London, Chatham and Dover engine No. 1 became South Eastern and Chatham No. 460, and so on. The rolling stock was fitted with the Westinghouse brake.

In connection with the competition between the London, Chatham and Dover Railway and its neighbour, the South Eastern Railway, it must be borne in mind that to all places to which the two Companies possessed rival routes the South Eastern Railway was first in the field, and the London, Chatham and Dover Railway showed considerable enterprise in building a line to a town which was already served by



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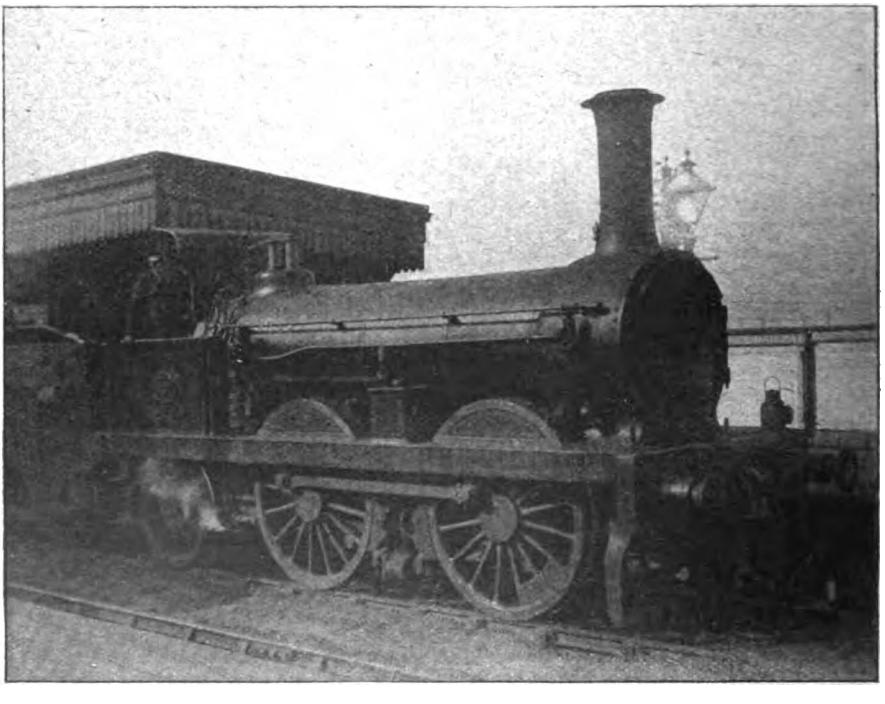
one railway, and where, perhaps, there was traffic only in paying quantities for one line.

When considering the train speeds of this railway, it is well to remember that the system was a comparatively small one, with its important stations situated less than 20 miles apart. This fact, and the severity of the gradients, is responsible for no very high average speeds being maintained between stops. Speaking of the locomotive work, Mr. Pearson Pattison said it was ". . . . a combination of good all-round and, on up grades, especially notable work by the fastest trains, which are not infrequently quite heavy. . . ."

The principal express services were (1) to and from Dover in connection with the Continental boats, and (2) to and from the Kent Coast resorts. It would serve no good purpose to refer to all the trains in detail, but briefly it may be stated that the down boat expresses were allowed from 105 to 110 min. to cover the 78 miles 34 chains between Victoria and Dover Pier, with a stop at Herne Hill, and in the case of the night train, at Canterbury also. The fastest of these trains ran from Herne Hill to Dover Pier without stop at a speed of just over 48½ m.p.h. The up trains were allowed 115 min., on account of the harder road in the up direction. There was also an additional stop at either Faversham or Chatham, in addition to that at Herne Hill. Less rapid were the Kent Coast expresses, but they served more intermediate stations, generally stopping *en route* at Chatham and Faversham and then principal stations to Ramsgate. A notable exception was the 5.10 p.m. from Holborn, which ran from St. Paul's to Westgate without a stop, 72 miles 43 chains in 90 min.—speed practically 48½ m.p.h.



*Photo]* [*H. L. Hopwood.*

0-4-2 TANK ENGINE NO. 1, RENUMBERED NO. 460 (ORIGINALLY *Brigand*).

Before leaving this part of the subject, we may further quote from Mr. Pearson Pattison's book some interesting particulars relating to train speeds. In 1896 the mileage of 60 express runs on the London, Chatham and Dover Railway (*i.e.*, runs between certain sections and not throughout journeys from starting point to destination) booked at from 40 to 45 m.p.h. was 1,242¾ miles, and the time allowed 1,770 min., the average speed of such runs being 42·13 m.p.h. Of the runs booked at over 45 m.p.h. there were 31, the mileage was 1,210 and the time allowance 1,544 min., giving an average speed of 47·02 m.p.h.

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There were, therefore, 91 runs of a total mileage of 2,452¾ booked at from 40 to 50 m.p.h., and the average speed of the whole was 44·41 m.p.h. Considering the various difficulties the Company had to contend with in the way of gradients, service slacks and crowded lines, such an average was very creditable.

Longest runs without stop were from Herne Hill to Dover Pier, 74 miles 36 chains, and from St. Paul's to Westgate, 72 miles 43 chains. The fastest run was made by the 8.30 a.m. Victoria to Queenborough Boat Express, which, leaving Herne Hill at 8.41, passed Sittingbourne (Middle Junction) at 9.29, the speed between those points averaging 50¼ m.p.h. for the distance of 40 miles 16 chains.

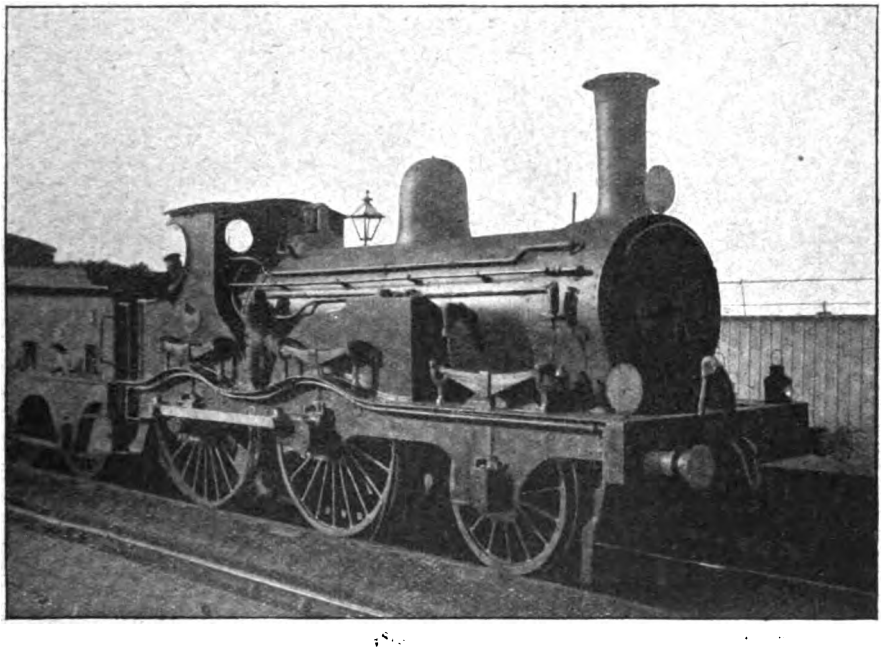
Finally, in an abridged form, from the same authority, particulars are given of two record runs between London and Dover which took place on June 12th and 14th, 1896 :—

| Distances. M. | C. | Stations. | | H. | M. | S. |
|---|---|---|---|---|---|---|
| | | Victoria | .. dep. | 12 | 51 | 22 p.m. (actual) |
| 0 | 0 | Victoria | .. dep. | 0 | 0 | |
| 3 | 78 | Herne Hill | .. pass | 5 | 10 | |
| 17 | 52 | Swanley | .. ,, | 19 | 53 | |
| 26 | 69 | Sole Street | .. ,, | 28 | 56 | |
| 34 | 28 | Chatham | .. ,, | 36 | 23 | |
| 44 | 58 | Sittingbourne | ,, | 47 | 3 | |
| 51 | 79 | Faversham | .. ,, | 54 | 25 | |
| 55 | 24 | Selling | .. pass | 58 | 9 | |
| 61 | 66 | Canterbury | .. ,, | 64 | 49 | |
| 71 | 53 | Shepherds Well | ,, | 74 | 56 | |
| 78 | 34 | Dover Pier | .. arr. | 81 | 56 | |

Dover .. arr. 2 13 18 p.m. (actual)
Average speed 57·43 m.p.h.

| Distances. M. | C. | Stations. | | H. | M. | S. |
|---|---|---|---|---|---|---|
| | | Dover | .. dep. | 11 | 38 | 23 p.m. (actual) |
| 0 | 0 | Dover Pier | .. dep. | 0 | 0 | |
| 3 | 27 | Kearsney | .. pass | 4 | 40 | |
| 6 | 61 | Shepherds Well | ,, | 9 | 14 | |
| 16 | 48 | Canterbury | .. ,, | 18 | 38 | |
| 23 | 10 | Selling | .. ,, | 25 | 53 | |
| 26 | 35 | Faversham | .. ,, | 28 | 39 | |
| 33 | 56 | Sittingbourne | ,, | 35 | 33 | |
| 44 | 6 | Chatham | .. ,, | 46 | 20 | |
| 51 | 45 | Sole Street | .. pass | 55 | 39 | |
| 74 | 36 | Herne Hill | .. ,, | 77 | 29 | |
| 78 | 34 | Victoria | .. arr. | 82 | 33 | |

Victoria .. arr. 1 0 56 a.m. (actual)
Average speed 57 m.p.h.



*Photo]* [*H. L. Hopwood.*

2-4-0 ENGINE NO. 47 (ORIGINALLY *Tempter*).

In each case the engine was No. 16, a 6 ft. 6 in. four-coupled bogie of the then latest type, and the load about 70 tons. To maintain a speed of 57 m.p.h. over a severe road, even with such a light load, is no easy task, and the two runs may be considered to rank equal to contemporary performances on the northern lines, which have nothing like such steep gradients as has the London, Chatham and Dover Railway.

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| Type | 0-4-2 tender | 2-4-0 tender | 4-4-0 tender | 2-4-0 tender | 2-4-0 tender | 2-4-0 tender | 4-4-0 tender | 4-4-0 tender | 0-6-0 tender | 0-6-0 tender |
|---|---|---|---|---|---|---|---|---|---|---|
| Date first built | 1862 | 1861 | 1862 | 1862 | 1865 | 1873 | 1877 | 1891 | 1861 | 1873 |
| Numbers | 1 and 2 | 4a, 8a, 9a, 10a, 11, 18, 21, 22, 26a | 27 to 29, 31 | 32 to 43 | 44 to 52 | 53-58 | 157 to 162, 175 to 186 | 3 to 10, 12 to 17, 19, 20, 23 to 26, 187 to 192 | 113 to 132 | 133 and 134 |
| Total No. in class | 2 | 9 | 4 | 12 | 9 | 6 | 18 | 26 | 20 | 2 |
| Cylinders (in.) | 16 × 22 | 17 × 22 | 17 × 22 | 17 × 22 | 17 × 24 | 17 × 24 | 17½ × 26 | 18 × 26 | 17 × 24 | 16 × 24 |
| Wheels (ft. and in.) | 5.0 | 5.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 5.0 | 4.6 |
| Heating surface (sq. ft.) | 833 | 1031 | 1087 | 907 | 1051 | 1121 | 1069 | 1110 | 1060 | 877 |
| Working pressure (lbs.) | 140 | 140 | 150 | 150 | 150 | 150 | 140 | 150 | 150 | 150 |
| Total weight (tons and cwts.) | 27.0 | 33.10 | 38.16 | 36.13 | 36.15 | 36.10 | 42.16 | 42.9 | 34.15 | 28.10 |

| Type | 0-6-0 tender | 0-6-0 tender | 2-4-0 tank | 0-4-2 tank | 2-4-0 tank | 0-4-2 tank | 0-4-4 tank | 0-6-0 tank | 0-4-4 tank | 0-4-4 tank |
|---|---|---|---|---|---|---|---|---|---|---|
| Date first built | 1876 | 1891 | 1864 | 1866 | 1873 | 1873 | 1875 | 1879 | 1880 | 1892 |
| Numbers | 135 to 140, 151 to 156 | 193 to 198 | 59 to 64 | 81-94 | 71 to 74 | 95 to 100 | 65 to 70 101 to 112 | 141 to 150 | 75 to 80 163 to 174 | 199 to 216 |
| Total No. in class | 12 | 6 | 6 | 14 | 4 | 6 | 18 | 10 | 18 | 18 |
| Cylinders (in.) | 17½ × 26 | 18 × 26 | 15 × 20 | 17 × 22 | 17 × 22 | 17 × 24 | 17½ × 26 | 17 × 24 | 17½ × 26 | 17 × 24 |
| Wheels (ft. and in.) | 4.10 | 5.0 | 5.6 | 5.6 | 5.6 | 5.7 | 5.3 | 4.6 | 5.7 | 5.6 |
| Heating surface (sq. ft.) | 1089 | 1102 | 881 | 853 | 883 | 754 | 1148 | 888 | 1095 | 1071 |
| Working pressure (lbs.) | 140 | 150 | 150 | 140 | 150 | 140 | 140 | 150 | 150 | 150 |
| Total weight (tons and cwts.) | 41.2 | 39.6 | — | — | 39.13 | 41.12 | 49.12 | 40.15 | 51.0 | 49.15 |

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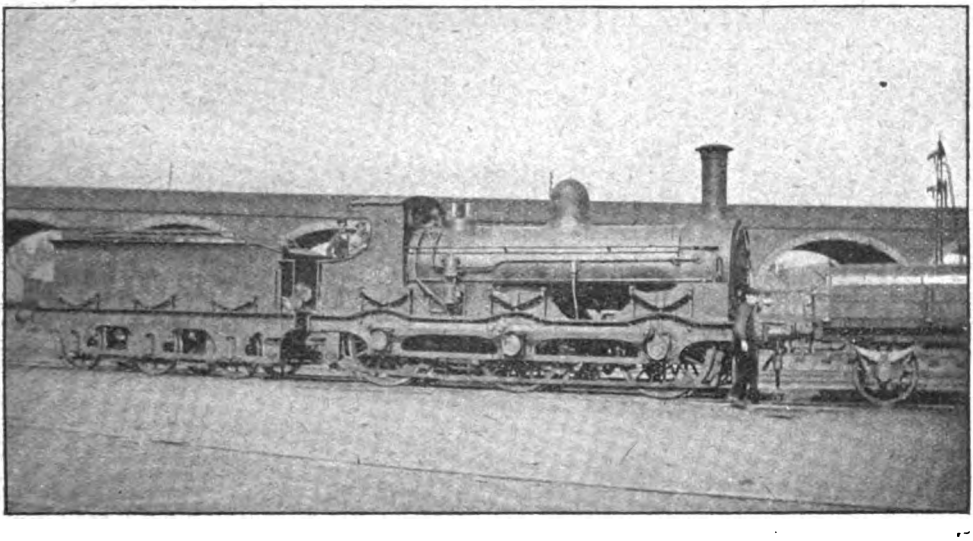
It is well known that for many years cordial relations did not exist between the London, Chatham and Dover and the South Eastern Railways. To most of the important towns served by the latter Company an alternative route had been provided by the London, Chatham and Dover Railway, who energetically pursued a policy of expansion, and the South Eastern Railway, not unnaturally, viewed with some concern the gradual invasion by a rival of territory which for many years it had regarded as its own. On several occasions proposals of amalgamation had been put forward as a means of ending the severe competition which existed, but nothing definite was done in this direction until 1899; nevertheless, for some years previously there had been a better understanding between the two Companies.

Fusion finally took place January 1st, 1899, and was formally sanctioned by Parliament August 1st following. It was arranged that the two railways should be worked as one system by a Managing Committee, the various capital stocks of the respective Companies remaining separate. It was further provided that after paying all expenses chargeable to revenue the net receipts were to be divided between the two Companies, the South Eastern taking 59 per cent. and the London, Chatham and Dover 41 per cent., the proportion of the Eastbourne traffic payable to the former Company not being included in the joint accounts. New capital was to be provided by the two Companies in proportion to their shares in the net receipts.

Although this review of the London, Chatham and Dover Railway extends only to the year 1898, we may, as a fitting conclusion, enumerate briefly some of the improvements which have since been made on the Chatham section of the South Eastern and Chatham Railway. Although in pre-amalgamation days physical junctions had existed between the two Companies at Blackfriars, Beckenham, Sevenoaks, Strood, Ashford, Dover, and Deal, it was considered advisable for the better working of the traffic, to have another junction in the neighbourhood of London, and accordingly connecting lines were made between the two systems at a point where the South Eastern Railway crosses the London, Chatham and Dover Railway south of Chislehurst station. These lines were the first new works put in hand after the amalgamation, and were opened in 1900.

More recently, extensive alterations have taken place at Dover and Margate, including the building of a new marine station at the former town. Other improvements carried out are the replacing by a handsome edifice of the forlorn looking frontage to Victoria station, and the much needed rebuilding of Ludgate Hill station.

At Rochester the main line has been widened and the station rebuilt. The



*Photo]* [*H. L. Hopwood.*

0-6-0 GOODS ENGINE NO. 118 (ORIGINALLY *Pyramus*).



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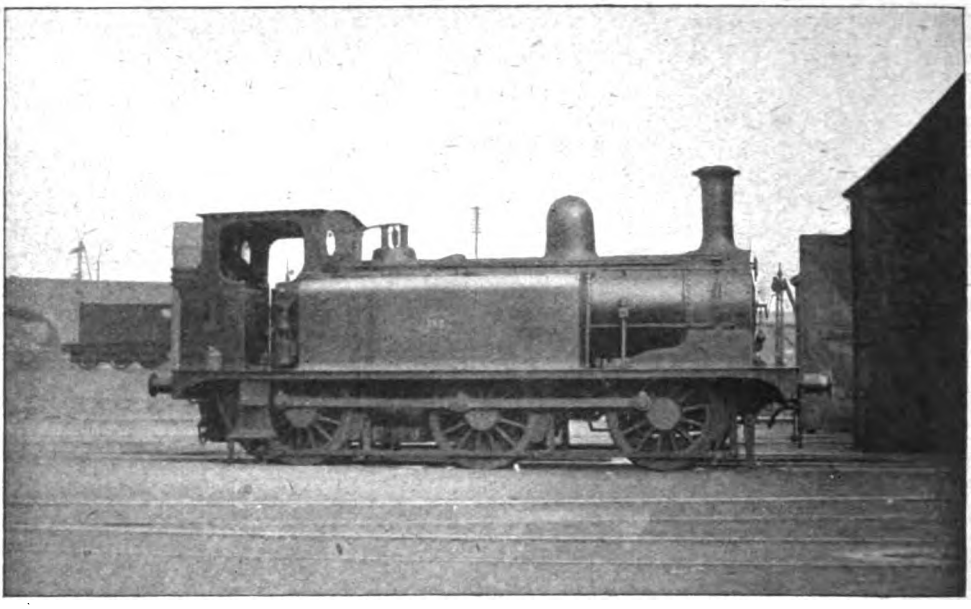

*Photo]* [*H. L. Hopwood.*

0-6-0 TANK ENGINE NO. 142.

London, Chatham and Dover branch from Strood to Strood Junction (known as the "Toomer Loop") has been abolished, part of the South Eastern line from Strood to Chatham Central, slightly diverted, taking its place. The other portion of this line, and the Chatham Central station—opened as recently as 1892—have been dismantled. With the abandonment of the "Toomer Loop" there disappears the starting point of the original East Kent Railway, for it will be remembered that in 1858 the first portion of this railway was opened from a junction with the South Eastern Railway at Strood, to Rochester and Faversham.

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# Locomotive and Train Working in the latter part of the 19th Century.

## NORTH EASTERN RAILWAY. [No. I.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

IN one respect the North Eastern was unique amongst British railways in that during the locomotive superintendency of Mr. Edward Fletcher until 1883 there was by far the largest variety of locomotive classes, shapes and sizes that ever ran on one line. In fact, it may truthfully be said that hardly two engines were alike in every particular. Even after 1874, when a faint and feeble attempt at some sort of standardization of certain of the newer classes was attempted, such engines began to assume differences of detail and colour after a few years, chiefly dependent upon the taste of the shops in which they were repaired. For the chief locomotive districts of this line had an amount of latitude allowed to them which almost bordered upon a go-as-you-please system. There were four principal locomotive shops, all of which did heavy repairs and rebuilding for all engines within their respective districts, though generally speaking only those at Gateshead and Darlington constructed new engines. These shops were (1) Gateshead, (2) Darlington, (3) York, and (4) Leeds.

The principal or North Eastern proper locomotive works were at Gateshead and were under the supervision of Mr. Fletcher himself. The main characteristics of the Gateshead engines were wrought iron chimneys, clumsy-looking large domes, but somewhat neat brass safety valve columns, and cabs of the shape shown in the illustration overleaf. The colour was light green picked out with dark green and black bands and with both vermilion and white lines. The underframes were red brown in colour, lined out with vermilion lines. The smokebox doors were of a rectangular shape, let in flush with the smokebox front and with all the rivet heads showing. Some had the hinge bars polished, but the majority were painted dead black.

The Darlington-built engines were completely different and retained many of the characteristics of the Stockton and Darlington locomotives, from which they sprang. The chimneys were shorter than those of the Gateshead engines and had a big taper, so that they were very much wider at the top than at the bottom. The domes were taller and of an even more unprepossessing shape than the Gateshead domes, and in some respects were very similar to the large domes formerly used on the Paris, Lyons and Mediterranean Railway in France. The brass safety valve columns were small, insignificant and plain. The cabs had flat tops and square sides. The smokebox doors were of the circular dished pattern and projected well out from the front of the smokebox, and had all hinges and hinge bars polished bright. The colour of the engines was a slightly lighter shade of green than the Gateshead engines, but the underframes were of a much darker chocolate colour.

The above differences relate to outward appearance only, but the details of motion, boilers, etc., were also completely different, and were originally due to Mr. Thomas Bouch, who had been chief locomotive engineer of the Stockton and Darlington section until 1875.

The York shops were under the charge of Mr. Stephenson, and had originally been the property of the old York and North Midland Railway. No new engines were constructed here by Mr. Fletcher, but by far the greater part of the engines in the southern division were rebuilt and repaired at York. In 1884, after Mr. McDonnell had succeeded Mr. Fletcher, five new engines were constructed at York; these were of Mr. Fletcher's design, of which the boilers, motion, and parts had been made at Gateshead. To make room for other work Mr. McDonnell had them sent to York, where they were put together. The York engines were, generally speaking, much neater than those which issued from the other North Eastern locomotive shops, and as far as rebuilding was concerned Mr. Stephenson appears to have



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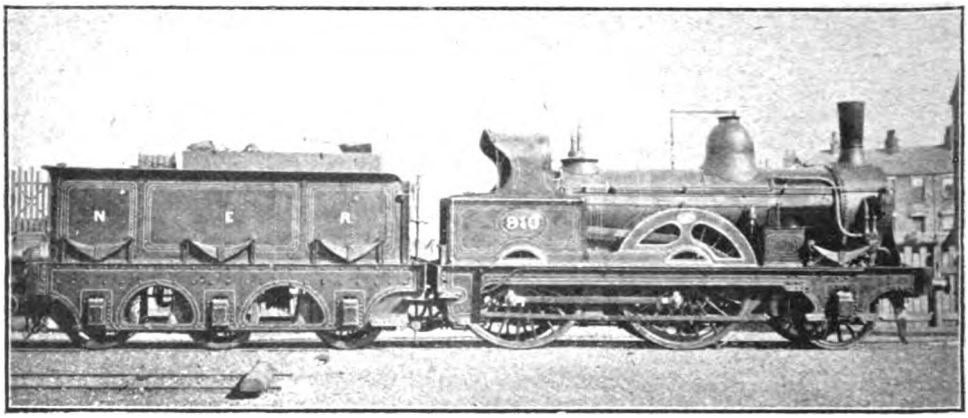


NO. 910 7 FT. COUPLED EXPRESS LOCOMOTIVE (FLETCHER).
Built at Gateshead, 1875. Cylinders 17 in. by 24 in.

had a free hand. The chimneys were of cast iron in one piece, the domes differed considerably in sizes and shapes, but generally were of a smaller and neater design than the Gateshead domes. The safety valve columns were of somewhat neat appearance, and the smokebox doors were dished and almost exactly like those of Mr. Patrick Stirling's Great Northern pattern. All the rivet heads in the York smokeboxes were countersunk. The cabs were somewhat after the Gateshead shape, and the colour of the engines was light green picked out with black bands and white lines. The underframes were claret colour with vermilion lines—in fact, the York colour scheme was throughout almost identical with that of Mr. Stirling's Doncaster practice.

The Leeds shops at Holbeck had originally belonged to the Leeds Northern, or the Leeds and Thirsk Railway as it was sometimes called, and under the supervision of Mr. Johnson, and afterwards Mr. Taylor, looked after the requirements, including the rebuilding, of all engines in the Leeds district. Extreme severity characterized the appearance of the engines which issued from Leeds shops. The wrought iron chimneys were very similar to the Gateshead pattern, the domes were a hybrid cross between Gateshead and Darlington, and the safety valves had a shape of their own, somewhat like a decanter, and were generally painted green instead of being of the usual North Eastern polished brass. But the cabs were the plainest and most ugly that existed; they were somewhat after the Stirling South Eastern pattern, but of a more ungainly shape. The smokeboxes had dished doors, painted dead black and were covered with a profusion of rivet heads. The Leeds shops had a green colour of their own—a brilliant emerald, which was thrown into prominence by being picked out with yellow lines. Prior to 1881 the underframes were painted the same green as the engines and the tenders carried large yellow letters N.E. on the back plates.

Until about 1881 all North Eastern tenders had an exact replica of the engine number plate painted on the sides. The engine number plates were of brass with large figures, and in this respect also Gateshead, Darlington and York had their own designs, in which the figures were of completely different sizes and shapes. Gateshead, Darlington and Leeds painted their number plates vermilion and reproduced them on the tenders in paint. York painted the plates the same green as the engines but usually omitted the replica on the tender, and after 1878 did so on all engines.

As if the above differences were not sufficient, there were also a large number of engines which had been built by Messrs. Stephenson, Hawthorn, Neilson, Dübs, etc., all of which were not only very different in appearance and details from those which had been constructed at Gateshead and Darlington, but were widely different from each other.*

* Mr. Acworth, in "The Railways of England" (p. 356, 5th Ed.), writes:—"In the running shed at Gateshead I found that 200 different patterns of nuts, bolts, pins, etc., were needed to meet the everyday requirements of the 120 engines that have their home there."

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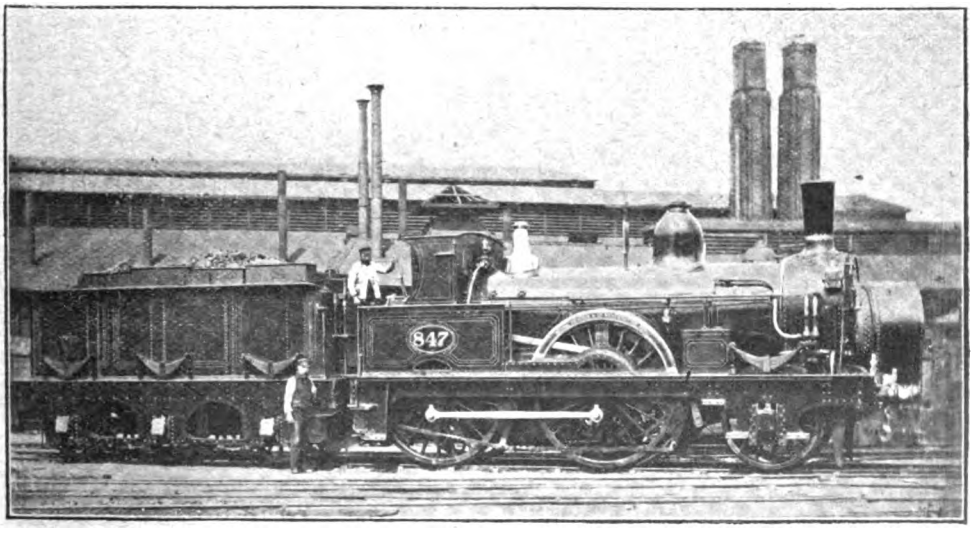
Finally, the drivers took a hand and made confusion worse confounded. Many engines were ornamented by the men with brass collars of various patterns, usually placed round the lower narrow portion of the chimneys, and the fronts of the smokeboxes had brass crowns, stars, and insignia of differing designs after the manner of regimental badges attached to them. But some of the drivers went further than this. One of the features of all the North Eastern passenger engines was a very large sandbox placed on the platform in front of the driving splashers, and a number of the men—chiefly in the Leeds district—utilized the space on the sides of the sandboxes for large transfer pictures. Generally speaking, the Royal Family, such as Queen Victoria and the then Prince of Wales, and also certain leading statesmen, were predominant, and so long as this was the case, the locomotive chiefs apparently took little notice of the transfers. But one fine day an enterprising driver of one of the 6 ft. coupled engines of the 686 class turned up in Leeds station with his engine, on the sandbox of which was a transfer picture depicting a classic nymph reclining in an extremely negligé attitude on the greensward. It was just one of those artistic productions which would have delighted the heart of a royal academician, the chief drawback being that Aphrodite or Ceres, or whoever the lady may have been, was hardly suitable for a locomotive sand-box. For some minutes the proud driver surveyed and beamed smilingly upon an enthusiastic crowd of passengers, porters, etc., that collected round the engine. The nymph lasted for a few days, being chiefly occupied in making trips between Leeds, Harrogate and Thirsk, and was the cynosure of all eyes on this portion of the line. Then she suddenly disappeared. I believe that the driver was rash enough to take her to York. Now York is, as everybody knows, not only the centre of North Eastern official activity, but also possesses a dean and chapter and various other dignified ecclesiastical luminaries. Whether the picture caught the eye of one of these dignitaries or whether one of the superior officials of the Company came across it I do not know, but the net result of whatever actually occurred was that the lady was promptly and effectively expunged with the aid of a pot of green paint.

I think this incident also put an end to the other transfer pictures, for at about the same time the Royal Family and the political celebrities also disappeared from the sandboxes. And not before it was time, for some of the more artistically minded engine cleaners had in their turn assisted at various improvements in their features, and some of the politicians were showing signs of having been severely "rebuilt." An ultra Radical cleaner had improved a striking likeness of the late Lord Beaconsfield by giving him a




NO. 847 (SERIES 844-853) 7 FT. COUPLED EXPRESS LOCOMOTIVE (FLETCHER).
Built by Beyer, Peacock & Co., Ltd., 1873. Cylinders 17 in. by 24 in.

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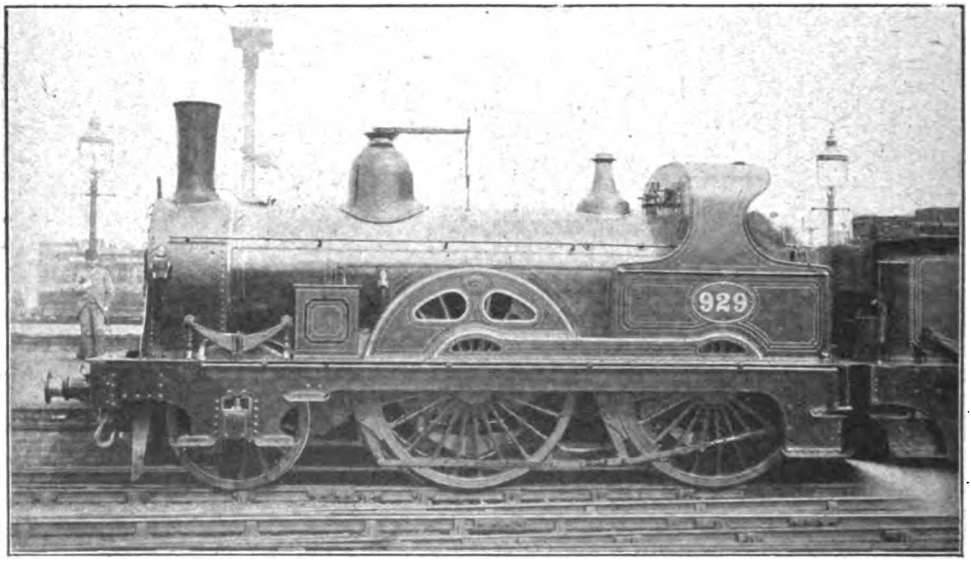
bad squint and a military moustache. In retaliation a cleaner with Tory leanings had blacked Mr. Gladstone's eye on another engine, and indulged in several minor structural alterations to the right honourable gentleman's features. But although the transfers came to a sudden termination the brass collars, crowns and stars lasted until the end of Mr. Fletcher's time, when his successor made a clean sweep of all "extras" of this nature.

A very unusual feature in North Eastern Railway practice until the end of the "'seventies" was the painting of the passenger carriages in different colours, after




NO. 929 (SERIES 924-933) 7 FT. COUPLED EXPRESS LOCOMOTIVE (FLETCHER).
Built by Neilson & Co., 1873. Cylinders 17 in. by 24 in.

the manner of the old Continental practice. The first and second class carriages were painted a dark plum colour, not so very different from but somewhat darker than the present style, but the third class carriages and brake vans were dark green. On the other hand the carriage stock in the Central or Darlington division, which had been the property of the Stockton and Darlington Railway, retained their old stained wood panels similar to the Great Northern colour. In the early "'eighties" the carriages were the most comfortable to ride in in the country.

The former locomotive working on the North Eastern was marked by a somewhat rigid restriction which kept certain engines on certain lines, and they were rarely to be seen elsewhere than on these roads. In this respect all railways followed the same method, but it always appeared to me that the North Eastern carried out this system more rigidly than many other lines. For instance, certain engines worked backwards and forwards between York and Harrogate, and many of the engines which ran between Leeds and Thirsk would rarely if ever be seen on the trains from Leeds to Scarborough or to Hull. Until 1883 the Gateshead express engines were divided into the south or York link and the north or Edinburgh link, and they rarely trespassed on each others' domains, nor did they ever leave these main lines until 1883, when the south link obtained a turn to Leeds *viâ* Sunderland. Of course this system generally involved considerable waiting at the end of a journey for a suitable train to take back over the same road. The restriction on the working hours of enginemen and firemen put an end to this method on many lines, and on none more so than the North Eastern. In order to enable the engine to earn its living and to do sufficient mileage it has to be kept at work, and now the North Eastern engines in some districts do a considerable amount of what may be termed "roundabout" work. One example will suffice. An engine stationed at Bradford, which at one time ran exclusively between

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Bradford and Harrogate, had its working changed some 15 years ago to the following. Leaving Bradford for Harrogate, it took the same coaches on from Harrogate to York, and thence to Hull *viâ* Market Weighton. In the evening it returned from Hull with a through fast train for Leeds and Bradford *viâ* the Selby direct line. The working was such that the engine used only $2\frac{3}{4}$ miles of the same road in going and returning, viz., the Midland length between Bradford and Shipley. There were several other similar instances, and a great advantage is gained in that much time is saved in eliminating turn-table work. Very frequently the engine is attached to the same train of coaches all day. This alteration in the method of working may, however, be said to be a product of the present century, or at least of the last year or two of the 19th century. A similar system of working may now be seen on the Midland and some other railways.

It was an extremely rare occurrence to see a four-coupled passenger engine of any class on a goods train, for Mr. Fletcher had a decided objection to any but six-coupled engines for goods traffic. The stores trains, consisting of four or five stores vans, were generally run by one or two of the oldest 2-4-0 engines, which, being on their last legs, were consequently specially set apart for this purpose. I am under the impression that the 6 ft. 2-4-0 engines—1440 class—which first appeared in 1876, were intended for main line express goods trains, but if so, their duties in this line of business were extremely short-lived, for they were very soon put to passenger work, on which they remained.

Coming now to details of the train services and locomotive working, the main line from York to Newcastle and Edinburgh demands priority. Leaving aside fast and semi-fast trains and dealing with the expresses, there were in the summer of 1880 four down trains, all of which formed part of the East Coast Scotch express service. The day express, the 2.25 p.m. from York, arrived at Newcastle without intermediate stop at 4.7 p.m., a run of $80\frac{1}{2}$ miles in 102 min., giving a running average of 47·3 m.p.h.* The best night express took 105 min. for the journey. There were three non-stop down trains from York to Newcastle. The fastest down train was, however, the 3.25 p.m. from York, which ran to Darlington, $44\frac{1}{4}$ miles, in 53 min., the running average being 50 m.p.h.

The up trains from Newcastle stopped at Darlington, and one of them also at Durham. No train ran through from Newcastle to York in 1880, and I believe I am correct in stating that this also held good in 1883. The best train was the up day Scotch express, which left Newcastle at 12.50 p.m. and ran to Darlington, 36 miles, in 48 min.; speed 45 m.p.h. Darlington to York was covered in 54 min., at an average speed of 49·2 m.p.h. The night express, however, required 60 min. from Darlington to York. On the northern portion of the main line between Newcastle and Edinburgh, to which city the North Eastern engines ran through from Berwick,† where all trains made a stop, the best train was the down day Scotch express, which was timed as follows:—

| Miles. | | p.m. | m.p.h. |
|---|---|---|---|
| $80\frac{1}{2}$ | York .. ... dep. | 2.25 | 47·3 |
| | Newcastle .. .. arr. | 4.7 | |
| $147\frac{3}{8}$ | ,, .. .. dep. | 4.12 | 46·7 |
| | Berwick .. .. arr. | 5.38 | |
| $204\frac{7}{8}$ | ,, .. .. dep. | 5.43 | 51·5 |
| | Edinburgh .. arr. | 7.0 | |

On the up journey the 10 a.m. from Edinburgh ran to Berwick in 1 hour 15 min., speed 46 m.p.h., and from Berwick to Newcastle in 1 hour 25 min., speed 47 m.p.h.

The trains consisted usually of ten to twelve 6-wheeled East Coast Joint Stock coaches of the Great Northern pattern. There were no dining cars, and half an hour was allowed at York for dining purposes on both the down and the up day expresses. In the early part of August the loads were naturally heavier, but I rarely remember more than 14 or 15 coaches on the down Scotchman, for it was usual to run a duplicate express, and double heading was an extremely rare occurrence on the North Eastern main line out of York.

The only exception was the 1.45 p.m. fast train from Newcastle to York, which was run by a York 7 ft. coupled express engine, and when the train was very heavily loaded it was piloted by a Gateshead engine as far as Darlington.

Of bogie coaches there were none until 1880, when the through Midland 9.30 a.m. train between Newcastle and Bristol provided the only carriages of this type to be

* It should be added that the 10 a.m. and 10.30 p.m. from Edinburgh and the 2.25 p.m. and 12.55 a.m. Scotch expresses from York were first and second class only, and therefore not quite so heavy as some of the other trains.

† Only the North Eastern passenger engines ran through to Edinburgh. The goods trains were handed over to North British engines at Berwick.

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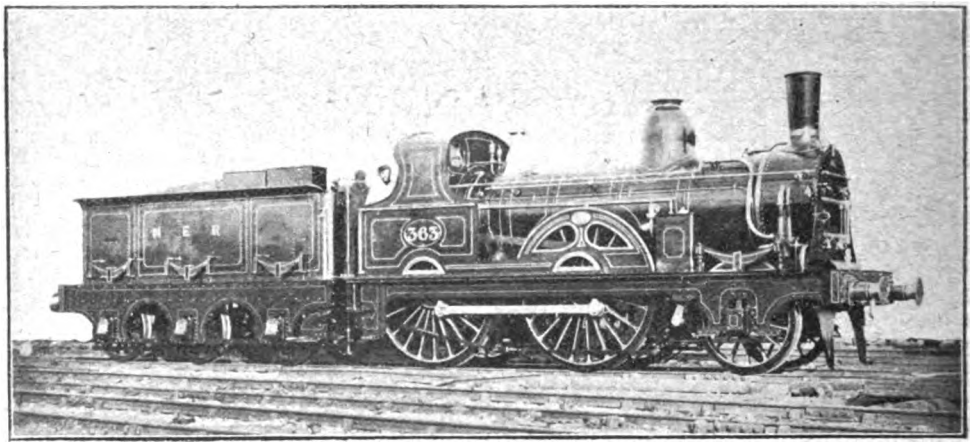
seen on the North Eastern. But it was a good many years later before the latter Company possessed any bogie stock of its own.

The engines which performed nearly the whole of the main line train working between York, Newcastle and Edinburgh from about 1873 were the well-known 7 ft. 2–4–0 express engines designed by Mr. Edward Fletcher. Of these there were 55 constructed between 1872 and 1882. The cylinders of the first 39 engines built from 1872 to 1876 were 17 in. by 24 in., but the 16 engines constructed in 1880 to 1882 had 17½ in. by 24 in. cylinders.* The leading wheels were of large diameter, 4 ft. 6 in., and the boilers had a total heating surface of 1,208½ sq. ft., but the grate area was comparatively small, being only 16 sq. ft. The weight of the engines was about 39½ tons in working order. They were known as the 901 class and their numbers were as follows:—901, 902 (1872), 903, 904 (1873), 905 to 909 (1874), 910 to 912, 156, 178, 53, 167, 329, 352 (1875), and 1459 (1876), all built at Gateshead. The dates given are those which were originally on the brass date plates. In addition Nos. 844 to 853 were constructed in 1873 by Messrs. Beyer, Peacock & Co., of Manchester, and 924 to 933 also in 1873 by Messrs. Neilson & Co., of Glasgow. The engines by Beyer, Peacock & Co. differed in outward appearance not only from those by Neilson & Co., but also from the Gateshead built engines. In 1880 there followed Nos. 362, 363, 365, 366, 367 and 135, in 1881 Nos. 368, 370, 640, 75, 464 and 153, and finally in 1882 Nos. 19, 265, 269 and 485 (afterwards 1325), all from Gateshead works.

With the exception of engines 156, 329, 352, 907, 908 and 909, and also 269 and 464 of the later series, all of which were stationed at York, all the others of the class were quartered at Gateshead shed. Until 1883 the York engines ran exclusively between there and Newcastle, whilst the Gateshead engines were divided into two separate links, which ran to York and to Edinburgh respectively. No. 167 was afterwards transferred from Gateshead to York sheds. This engine had previously generally done duty as main line pilot engine at Newcastle.




NO. 363 FLETCHER 7 FT. 2–4–0 EXPRESS LOCOMOTIVE.
Built at Gateshead, 1880. Cylinders 17½ in. by 24 in.

In 1883 there was introduced a new service of two trains in each direction between Newcastle and Liverpool *viâ* Sunderland, Harrogate and Leeds, and a modification in the working was made to enable the Fletcher express engines to run them.

The Gateshead engine ran direct to Leeds, where it arrived at about 10.45 a.m., and having stayed the day there returned with the Liverpool express, which left Leeds for Newcastle at about 7.30 p.m. The trains in the opposite direction were worked by the York engines 269 and 909 on alternate days, but as it was found inconvenient to work the engines from York to Leeds in the early morning, they were after a few months transferred to and stationed at Leeds.

*(To be continued.)*

* When these engines were rebuilt by Mr. T. W. Worsdell from 1885 onwards, the cylinders of most of them were enlarged to 18 in. by 24 in., but for some unaccountable reason smaller boilers were provided.

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# Railway Electrical Progress and Practice.

## AN ALL-ELECTRIC MAIN LINE RAILWAY OF THE FUTURE. [No. V.]

By "INDICATOR."

(*Continued from page* 270, *October* RAILWAY MAGAZINE.)

IT is now necessary to deal with the passenger train services. In the first article a poster was reproduced giving particulars of the special Marsden expresses. If booked non-stop between Rayhampton and Marsden the time allowance for the 67 miles is 70 min., with 5 min. added for stops at Caxton or Kenton, when made. Thus, from Rayhampton there are non-stop trains at 9 and 10.10 a.m. and 1 and 5.30 p.m.; 75 min. trains calling at Kenton at 11 a.m., 12 noon, and 2.30 p.m.; and 80 min. trains calling at Caxton and Kenton at 8.0 a.m., and 3.30, 4.30, 6.20, 7.40, 9, and 10.30 p.m. and 12 midnight, the last mentioned being a through Northern express by which Marsden passengers are allowed to travel. The through services are completed by the 5.15 a.m. (through Northern express, calling at Ashford, Stuart, Caxton and Kenton), 6.40 a.m. and 1.30 p.m. (Stuart, Caxton and Kenton). All trains except the 5.15, 6.40, 11 a.m., and 1.30, 9, 10.30 p.m. and midnight trains have buffet saloons. Up trains correspond, but need not be given in detail. The total service provides no fewer than 37 express trains, 23 with buffet saloons, and all of these, except the two Northern trains noted, are made up of Rixford, Penton and Lowminster sections as previously described. Most of the buffet saloon trains consist of five cars for Rixford, two for Lowminster and two for Penton, and correspond to the diagram given in the second article. The others consist of three or four Rixford vehicles, and two for each of the other routes.

Through Northern expresses, except the 5.15 a.m. and 12 midnight, are not available for passengers travelling only between "Marsden" stations. They are run non-stop between Rayhampton and Marsden in 70 min., calling at Marsden to pick up passengers, and at Rixford for taking up passengers and for changing engines with the Northern Railway. These trains leave Rayhampton at10 a.m., 2 p.m., 5 p.m., 8 p.m. and 11.40 p.m. They are each worked with two electric locomotives in front, whereas the Marsden expresses have one in front and one in rear, the former working the Rixford section and the latter the Penton section, which is run from Marsden to Penton *viâ* Drayton.

Many of the down Belmont expresses run 10 or 15 min. behind a Marsden express, stopping first at Stuart, where the Seastone and Alford portion is detached. Where a Belmont express is run separately it usually goes through to Caxton without stop. The following classification is one published by the Company and covers the principal features of the main line services :—

A. THROUGH NORTHERN EXPRESSES. These are not available for passengers from Rayhampton to Stuart, Caxton, Kenton, Marsden, Rixford, Penton, Lowminster, or other stations on the Rayhampton, Marsden and Belmont Railway, except the 5.15 a.m. and 12 midnight down trains and the corresponding up trains due at 7.30 a.m. and 1.25 a.m.

B. SPECIAL MARSDEN EXPRESSES. A majority include buffet car accommodation available between Rayhampton and Rixford for first and third class passengers. Trains include through portions for Penton and Lowminster, and access can be had to the buffet car (when run) between Rayhampton and Marsden.

C. BELMONT, SEASTONE AND ALFORD-ON-SEA EXPRESSES. Except where otherwise noted, these trains include through portions for all three destinations. The buffet car, when run, is included in the Belmont portion, but other passengers have access thereto between Rayhampton and Stuart. The Belmont section is usually continued through to either Elverton or Heston, but not to both destinations, so that passengers for only one of these routes require to change carriages at Belmont. Certain



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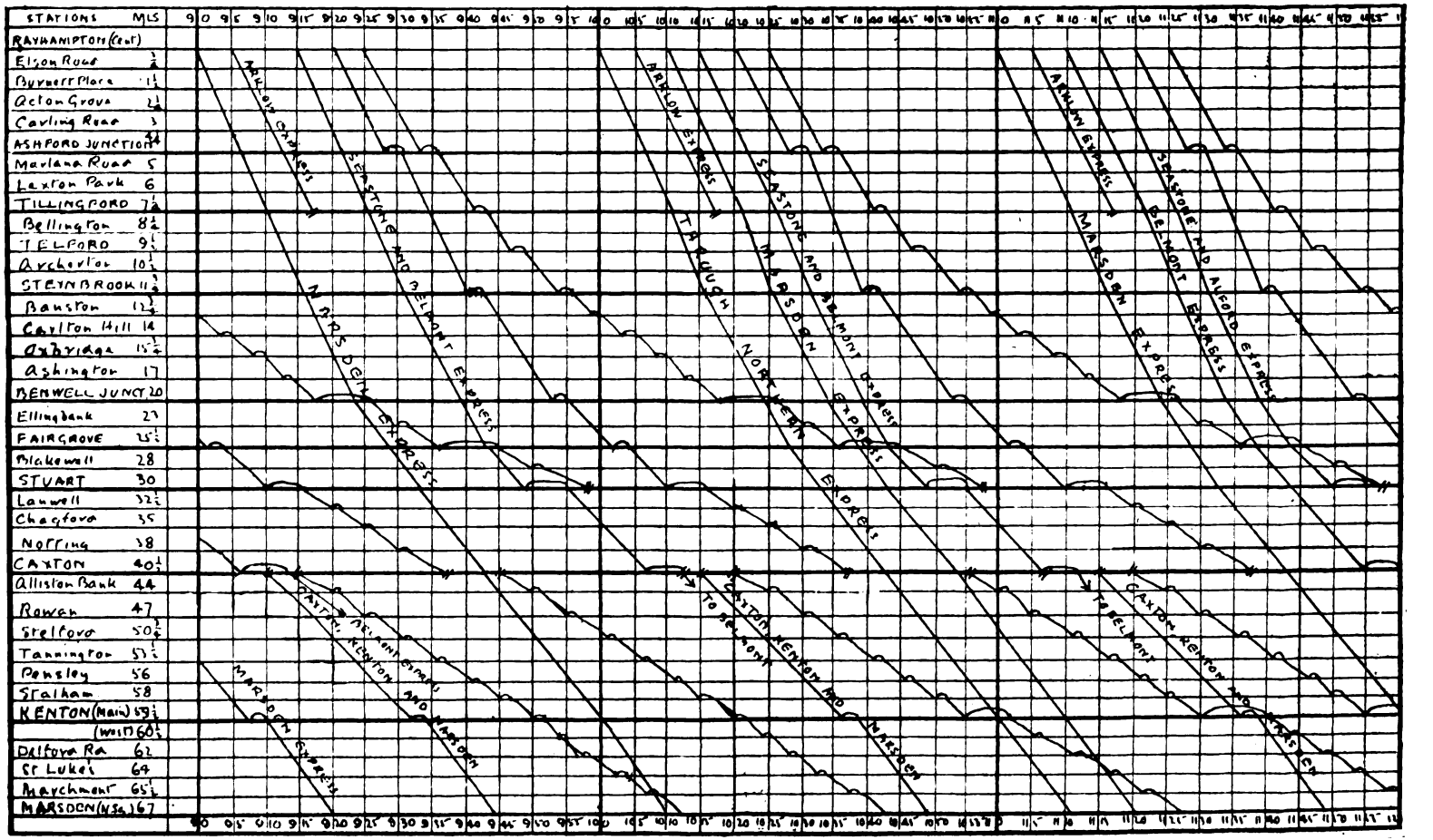


DOWN MAIN LINE PASSENGER TRAINS, RAYHAMPTON-MARSDEN SECTION, 9 A.M. TO 12 NOON.

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special trains include through portions for both Heston and Elverton, and in the summer holiday periods through Elverton and Alford trains are run in each direction, not calling intermediately.

D. ARKLOW EXPRESSES. These do not call at stations between Rayhampton and Arklow, making the journey of 35 miles in 45 min.

E. SECONDARY MAIN LINE EXPRESSES. Call at Ashford Junction, Steynbrook, Benwell Junction, Fairgrove, Stuart and stations thence to Caxton.

F. STOPPING MAIN LINE TRAINS. Call at Ashford Junction, Tillingford, Telford, Steynbrook and stations thence to Stuart.

Passengers for stations between Caxton and Marsden and between Caxton and Belmont should travel by first available express to Caxton, whence a good service of stopping trains is available on each route. Passengers for Kenton, at times when a through Marsden express calling there is not available, may travel by Belmont express to Caxton, where they can join one of the local Caxton, Kenton and Marsden expresses or a stopping train on the same route. Some of the connections thus provided are only a little slower than the through services.

Although the railway is operated electrically in every department, and at one time it was thought that electric traction would enable exceptional speeds to be realised, experience has shown that such possibilities, though quite practical, must give way to traffic considerations; and that it is preferable to give a plentiful service and maintain a good standard for all trains, rather than to operate a few exceptional schedules to which nearly everything else must be sacrificed. A booking of 70 min. for 67 miles involves good work, especially as this is done regularly with trains of considerable weight, the usual 9 cars representing 300 tons empty, while some of the through Northern expresses load up to 450 tons. Moreover, many other smart schedules are involved, the standard times, notwithstanding a speed restriction to 35 miles per hour between Rayhampton (Central) and Burnett Place, and 50 miles per hour for the fast trains thence to Ashford Junction, for respective stages being :—

| | | | | |
|---|---|---|---|---|
| Rayhampton to Stuart | 30 | miles, | 34 | min. |
| ,, Caxton | 40½ | ,, | 45 | ,, |
| ,, Kenton | 59½ | ,, | 62 | ,, |
| ,, Marsden | 67 | ,, | 70 | ,, |
| ,, Arklow | 35 | ,, | 45 | ,, |
| Stuart to Caxton .. | 10½ | ,, | 12 | ,, |
| Caxton to Kenton .. | 19 | ,, | 22 | ,, |
| Kenton to Marsden .. | 7½ | ,, | 10 | ,, |

These call for a running average of about 60 miles per hour when clear of the complicated sections and station areas. Moreover, a number of the secondary trains require smart working between stations; but even then it is sometimes necessary to arrange for an express train passing an ordinary train at an intermediate station.

Down trains generally run in groups, and the general features are well shown by the traffic diagram reproduced on page 338, which shows all down main line passenger trains between Rayhampton and Marsden between 9 a.m. and noon. The 9 a.m. non-stop express to Marsden is booked to pass Benwell Junction at 9.23 (20 miles), notwithstanding that 7 min. are allowed for the 4¼ miles to Ashford Junction. The 8.25 stopping train for Rayhampton is kept at Benwell Junction from 9.18 until 9.26 to allow the express to pass, while the latter runs through Caxton at 9.43 between the arrival at 9.37 of the 8.20 secondary main line train from Rayhampton and the departure of the 9.45 stopping train from Caxton to Marsden. The 9.15 stopping train from Caxton to Marsden is able to clear for the express as it gets on to the four-track at St. Luke's, the express passing it at Marchmont.

At 9.5 is an Arklow express passing Tillingford at 9.17; and at 9.15 is a Belmont and Seastone express, which passes the 8.25 from Rayhampton at Fairgrove and reaches Stuart at 9.49. The Belmont portion proceeds at 9.55 and is due at Caxton at 10.7. Immediately after its departure at 10.13, a Caxton, Kenton and Marsden express leaves at 10.15, reaching Kenton at 10.36, and Marsden at 10.49.

The 9.20 from Rayhampton is a secondary main line train calling at Ashford, Steynbrook, Benwell Junction, Fairgrove, Stuart, and thence stations to Caxton, where it arrives in time to allow the 10 and 10.10 expresses to pass, then connecting with the 10.55 stopping train to Marsden. The 9.25 a.m. from Rayhampton stops at Ashford, Tillingford, Telford and Steynbrook, and thence stations to Stuart, though it has to be delayed at Benwell Junction and Fairgrove to allow expresses to pass. It is not practicable to make it connect at Stuart with the 10.15 Belmont express, but it feeds the 10.20 secondary express for stations onwards to Caxton.

An interval of 35 min. at Rayhampton is followed by another series, 10 a.m. Northern (non-stop to Marsden); 10.5 Arklow; 10.10 Marsden non-stop; 10.15 Belmont and Seastone; 10.20 secondary main line; and

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10.25 stopping main line. Another series commences at 11 a.m. Marsden non-stop, 11.5 Arklow, 11.10 Belmont (non-stop to Caxton), 11.15 Seastone, 11.20 secondary main line, and 11.25 stopping main line.

As the day's programme is developed these arrangments become modified; but the same general principles are maintained, to give substantially hourly Marsden, Arklow, Belmont, Seastone, secondary main line and stopping main line trains running in groups. Thus the midday insertion of a 1.30 p.m. fast train for Marsden following the 1 p.m. non-stop express, changes over the usual departure at about the even hour to the half-hour, which is continued until the evening. Other services are similarly modified; but still retain the characteristics noted.

From Caxton to Marsden there are hourly Kenton and Marsden expresses connecting with the Belmont expresses, thus compensating for such Marsden expresses as do not serve Kenton, or giving additional facilities. There are also approximately half-hourly stopping trains, while half-hourly Iston–Marsden trains combine to give a 15-min. service of stopping trains between Kenton and Marsden. Hourly expresses between Marsden and Iston (calling at Kenton only), alternate with hourly trains between Marsden and Belmont, and combine with the Caxton–Marsden local expresses to give at least three non-stop trains between Kenton and Marsden in each hour.

As a rule, the secondary main line, stopping main line and the Caxton, Iston and Belmont–Marsden expresses consist of four bogies drawn by a locomotive of Class B, but at busy periods some of them require strengthening. The Arklow expresses are also four car trains at slacker periods. The Marsden expresses have already been described in regard to make-up, while the Belmont and Seastone trains usually consist of five cars for Belmont, three for Alford, and two for Seastone. The Belmont section is continued either to Elverton or Heston; but where a special Belmont express is run this usually consists of eight cars, four going to Elverton and four to Heston. These are run by engines in front and rear from Rayhampton to Belmont and thence to Doxford Junction, reversing without shunting at Belmont. The separate Stuart expresses consist, as a rule, of five cars for Alford and three for Seastone, the whole, with engines in front and rear, reversing at Stuart and dividing at the junction for the respective destinations.

Ordinary Belmont expresses call at Playford and Ellingford Junctions only beyond Caxton and thence stop at all stations to Elverton or Heston, as the case may be. An hourly service of stopping trains leaves Caxton after the arrival of the secondary main line train, proceeding thence to Ellingford Junction in advance of an express, and following it to Belmont as a slow. These stopping trains continue to Doxford Junction intermediately with the continuations of expresses, and proceed to the branch not served thereby, or as desired. The object of running the Belmont expresses alternately to Elverton or Heston is to give through facilities for both, though not always by the same service. There are, however, connecting trains arranged; and in combination with the Caxton locals, the Marsden–Belmont trains, and a shuttle train also utilised, there is substantially a half-hourly service on each of the routes beyond Belmont, while hourly Heston–Elverton trains further amplify the rather busier Heston–Belmont section. The Marsden–Belmont trains are fast between Marsden and Kenton, but stop at all stations to Ellingford Junction and thence to Belmont.

To Seastone and Alford-on-Sea the hourly service given by the Seastone portions of Belmont expresses, or by equivalent trains, affords sufficient facilities for these branches, all stations being usually called at.

When special summer expresses are run for Elverton or Alford-on-Sea, the usual make-up is 8 or 10 cars, with engines in front and rear, and these make non-stop runs, in 95 min. to Elverton (83 miles) and in 55 min. to Alford-on-Sea (44 miles). In the former case Buffet Cars are included. Times are somewhat slower between Caxton and Belmont than towards Marsden, in view of the grades and certain traffic difficulties, while on the branches there are several sharp curves and heavy gradients; hence the rather longer, though still creditable times, of these special trains. The summer times of these trains are 10.50 a.m. and 3.0 p.m. for Elverton, and 10.55 and 3.5 for Alford-on-Sea.

Before returning to the southern section the general features of traffic in the Marsden area may be reviewed. By correlating the various trains from the south to Marsden and east, together with certain local sets, the general principle is maintained of half-hourly expresses between Marsden and Rixford, Marsden and Penton, and Marsden and Lowminster; with a 15-minute service of stopping trains on each route. Only the

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Rayhampton expresses are divided as before described, and all other services from the south are kept to the Rixford route, that being the only one calling for at least four cars regularly. The other services are local, and consist of three cars as standard and locomotive. All services inter-connect at Marsden.

On Sundays there are Northern Expresses at 10.0 a.m., 2.0 p.m., 8.0 p.m., 11.30 p.m., and 12.0 midnight. The two former and the last call at Stuart, Caxton and Kenton, and are also available for Marsden passengers. There are further combined Marsden–Rixford and Marsden–Belmont expresses calling at Stuart (passengers change for Seastone and Alford-on-Sea) and dividing at Caxton, at 9.0 a.m., 12 noon, and 3.0, 6.0, and 9.0 p.m. Stopping trains calling at Ashford Junction, Steynbrook, and stations to Caxton leave Rayhampton at 8.0 and 11.0 a.m., and at 2.5, 5.0, and 8.5 p.m., with one to Benwell Junction at 10.5 p.m. Arklow expresses run at 7.45, 8.45, 9.45, and 10.45 a.m., and at 1.15, 2.15, 4.15, 6.15, 9.5, and 10.45 p.m.

At this stage the following list of main line trains leaving Rayhampton Central station will be of interest :

| Time. | Classification of Train. | Notes. |
|---|---|---|
| a.m. | | |
| 3.20 .. | Secondary main line .. .. .. | |
| 4.25 .. | Stopping main line .. . .. | |
| 5.15 .. | Northern Express .. .. .. | Available to stations served on Rayhampton, Marsden and Belmont Railway. First stop, Stuart. |
| 5.20 .. | Secondary main line .. .. | |
| 5.25 .. | Stopping main line .. .. .. | |
| 6.40 .. | Marsden Express .. .. .. | First stop Stuart. |
| 6.45 .. | Secondary main line .. .. | |
| 6.50 .. | Stopping main line .. .. .. | |
| 7.5 .. | Arklow Express .. .. .. | |
| 8.0 .. | Marsden Express .. .. .. | First stop Caxton. Buffet Car. |
| 8.5 .. | Arklow Express .. .. .. | |
| 8.15 .. | Belmont and Seastone Express .. | First stop Stuart. |
| 8.20 .. | Secondary main line .. .. | |
| 8.25 .. | Stopping main line .. .. .. | |
| 9.0 .. | Marsden .. .. .. .. | Non-stop. Buffet Car. |
| 9.5 .. | Arklow Express .. .. .. | |
| 9.15 .. | Belmont and Seastone Express .. | First stop Stuart. Buffet Car. Express connection, Caxton to Kenton, etc. |
| 9.20 .. | Secondary main line .. .. | |
| 9.25 .. | Stopping main line .. .. .. | |
| 10.0 .. | Northern Express .. .. .. | Restaurant Cars. |
| 10.5 .. | Arklow Express .. .. .. | |
| 10.10 .. | Marsden Express .. .. .. | Non-stop. Buffet Car. |
| 10.15 .. | Belmont Express .. .. .. | First stop Stuart. Buffet Car. Express connection, Caxton to Kenton, etc. |
| 10.20 .. | Secondary main line .. .. | |
| 10.25 .. | Stopping main line .. .. .. | |
| 10.50 .. | Special Elverton Express .. .. | Summer only. Buffet Car. Non-stop. |
| 10.55 .. | Special Alford Express .. .. | Summer only. Non-stop. |
| 11.0 .. | Marsden Express .. .. .. | Non-stop to Kenton. |
| 11.5 .. | Arklow Express .. .. .. | |
| 11.10 .. | Belmont, Elverton & Heston Express | Buffet Car. Non-stop to Caxton. |
| 11.15 .. | Seastone and Alford Express .. | First stop Stuart. |
| 11.20 .. | Secondary main line .. .. .. | |
| 11.25 .. | Stopping main line .. .. .. | |
| 12.0 .. | Marsden Express .. .. .. | First stop Kenton. Buffet Car. |
| 12.5 .. | Arklow Express .. .. .. | |
| 12.15 .. | Belmont and Seastone Express .. | First stop Stuart. |
| 12.20 .. | Secondary main line .. .. | |

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| Time. | Classification of Train. | Notes. |
|---|---|---|
| a.m. | | |
| 12.25 .. | Stopping main line .. .. .. | |
| 12.35 .. | Arklow Express .. .. .. | Saturdays only. |
| p.m. | | |
| 1.0 .. | Marsden Express .. .. .. | Non-stop. Buffet Car. |
| 1.5 .. | Arklow Express .. .. .. | |
| 1.10 .. | Belmont, Elverton & Heston Express | First stop Caxton. Buffet Car. Express connection Caxton to Kenton, etc. |
| 1.15 .. | Seastone and Alford Express .. | First stop Stuart. |
| 1.20 .. | Stuart Semi-fast .. .. .. | First stop Steynbrook (pick up only), and stations to Stuart. Saturdays only. |
| 1.30 .. | Marsden Express .. .. .. | Stuart, Caxton, Kenton, Marsden, etc. |
| 1.35 .. | Arklow Express .. .. | Saturdays only. |
| 1.40 .. | Secondary main line .. .. | |
| 1.45 .. | Stopping main line .. .. .. | |
| 2.0 .. | Northern Express .. .. .. | Restaurant Cars. |
| 2.5 .. | Arklow Express .. .. .. | |
| 2.10 .. | Belmont, Elverton & Heston Express | First stop Caxton. Buffet Car. |
| 2.15 .. | Seastone Express .. .. .. | First stop Stuart. |
| 2.30 .. | Marsden Express .. .. .. | First stop Kenton. Buffet Car. |
| 2.35 .. | Secondary main line .. .. | |
| 2.40 .. | Stopping main line .. .. .. | |
| 2.45 .. | Arklow Express .. .. .. | |
| 3.0 .. | Special Elverton Express .. .. | Summer only. Buffet Car. Non-stop. |
| 3.5 .. | Special Alford Express .. .. | Summer only. Non-stop. |
| 3.15 .. | Belmont and Seastone Express .. | First stop Stuart. Buffet Car. |
| 3.30 .. | Marsden Express .. .. | First stop Caxton. Buffet Car. |
| 3.35 .. | Secondary main line .. .. | |
| 3.40 .. | Stopping main line .. .. .. | |
| 3.45 .. | Arklow Express .. .. .. | |
| 4.15 .. | Belmont and Seastone Express .. | First stop Stuart. Buffet Car. |
| 4.30 .. | Marsden Express .. .. .. | First stop Caxton. Buffet Car. |
| 4.35 .. | Secondary main line .. .. | |
| 4.40 .. | Stopping main line .. .. .. | |
| 4.45 .. | Arklow Express .. .. .. | |
| 5.0 .. | Northern Express .. .. .. | Restaurant Cars. |
| 5.10 .. | Belmont, Elverton & Heston Express | First stop Caxton. Buffet Car. Express connection Caxton to Kenton, etc. |
| 5.15 .. | Seastone Express .. .. .. | First stop Stuart. |
| 5.20 .. | Stuart Semi-fast .. .. .. | Steynbrook (pick up only), and stations to Stuart. Not on Saturdays. |
| 5.25 .. | Arklow Express .. .. .. | |
| 5.30 .. | Marsden Express .. .. .. | Non-stop. Buffet Car. |
| 5.40 .. | Secondary main line .. .. | |
| 5.50 .. | Stopping main line .. .. .. | |
| 6.0 .. | Belmont and Seastone Express .. | First stop Stuart. Buffet Car. |
| 6.5 .. | Arklow Express .. .. .. | |
| 6.20 .. | Marsden Express .. .. .. | First stop Caxton. Buffet Car. |
| 6.45 .. | Secondary main line .. .. | |
| 6.50 .. | Stopping main line .. .. .. | |
| 7.5 .. | Arklow Express .. .. .. | |
| 7.15 .. | Belmont and Seastone Express .. | First stop Stuart. Buffet Car. Express connection Caxton to Kenton, etc. |
| 7.40 .. | Marsden Express .. .. .. | First stop Caxton. Buffet Car. |
| 7.45 .. | Secondary main line .. .. | |
| 7.50 .. | Stopping main line .. .. .. | |
| 8.0 .. | Northern Express .. .. .. | Sleeping Cars. |

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| Time. | Classification of Train. | Notes. |
|---|---|---|
| p.m. | | |
| 8.5 .. | Arklow Express .. .. .. | |
| 8.30 .. | Belmont and Seastone Express .. | First stop Stuart. |
| 9.0 .. | Marsden Express .. .. .. | First stop Caxton. |
| 9.5 .. | Arklow Express .. .. .. | |
| 9.15 .. | Secondary main line .. .. | |
| 9.20 .. | Stopping main line .. .. .. | |
| 10.0 .. | Belmont and Seastone Express .. | First stop Stuart. |
| 10.5 .. | Arklow Express .. .. .. | |
| 10.30 .. | Marsden Express .. .. .. | First stop Caxton. |
| 10.35 .. | Secondary main line .. .. | |
| 10.40 .. | Stopping main line .. .. .. | |
| 11.5 .. | Caxton Express .. .. .. | |
| 11.15 .. | Belmont and Seastone (Semi-fast) .. | First stop Stuart. |
| 11.30 .. | Stopping main line .. .. .. | |
| 11.40 .. | Northern Express .. .. .. | Sleeping Cars. |
| 12.0 .. | Northern Express .. .. .. | (Available for passengers to Caxton, Kenton, Marsden, etc.). First stop Caxton. |
| 12.5 .. | Arklow Express .. .. .. | |
| 12.10 .. | Steynbrook and stations to Benwell Junction .. .. .. .. | |

The Topley and Eston branch trains usually make connections with the stopping services, but a few extra connections are given with secondary main line trains where practicable with the one locomotive and train in service. Neither of these deals with heavy traffic, and most of the local goods traffic is worked attached to the regular trains, though the local-engine (of special accumulator design, as previously described) makes an early morning and a night trip for conveying coal and heavy goods.

Between Marsden and Penton only the fast trains are operated by the Marsden Company, the locals from North Square terminating at Orwell, the intermediate service between Orwell and Penton being provided by the Easthampton locals from their station in Marsden.

It is now necessary to deal with the local services in the Rayhampton area. These are mainly made up, as mentioned, of six or seven-car multiple-unit trains, divided to form three or four-car sets at lighter periods. Four-car locomotive sets form the basis of the Johnstone and Chillington trains, from Osborn Street as well as from Central. The standard arrangements adopted for each hour are :—

*Western Routes from Central.*

(U Indicates through Underground trains, which join outside the Central station.)

Min.
0 Stopping train to Stoneford Junction.
U Underground stopping train to Notbrook.
15 Stopping train to Weston.
25 Johnstone train, fast to Stoneford Junction, thence all stations. Connection Leigh to Bentley.
30 Stopping train to Stoneford Junction.
U Underground stopping train to Notbrook.
45 Stopping train to Weston.
58 Chillington train, calling at Weston, Notbrook, and stations to Chillington.

*Eastern Routes from Central.*

0 Stopping train to Steynbrook.
5 ,, ,, North Bentley.
10 ,, ,, Stoneford Junction *viâ* Ashford.
15 ,, ,, Mannington.
20 ,, ,, South Bentley.
25 ,, ,, Albert Park.
30 ,, ,, Steynbrook.
35 ,, ,, North Bentley.
40 ,, ,, Notbrook *viâ* Ashford.
45 ,, ,, Mannington.
50 ,, ,, South Bentley.
55 ,, ,, Albert Park.

*From Osborn Street.*

0 Stopping train to Oxwell.
5 ,, ,, South Bentley.
10 ,, ,, Tillingford.
15 ,, ,, Oxwell.
20 ,, ,, North Bentley.
25 ,, ,, Notbrook.
27 Fast train to Johnstone, passing the Notbrook train between Osborn Street and Ashwell Junction, and

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Min. calling only at Ashwell Junction, Ashford Junction, Lexington Place, Stoneford Junction, and stations beyond.
30 Stopping train to Oxwell.
35 ,, ,, South Bentley.
40 ,, ,, Tillingford.
45 ,, ,, Oxwell.
50 ,, ,, North Bentley.
55 ,, ,, Stoneford Junction.
57 Fast train to Exholme, passing the Stoneford Junction train between Osborn Street and Ashwell Junction, and calling only at Ashwell Junction, Ashford Junction, Lexington Place, Notbrook, and stations thence to Exholme.

The South Bentley trains follow a North Bentley train from Central, and *vice versa*, so that only a few minutes' wait is involved at Ingleton, whichever change is necessary.

As the Central and Osborn Street trains to and from North and South Bentley provide two sets of 15-minute trains, a 5-minute service between Norford Junction and Ingleton (a busy dock-side section) is completed by 15-minute trains of three cars running alternately to Tillingford and Albert Park, half-hourly on each route.

There are not many extra trains necessary at business hours to meet the pressure of traffic, seeing that it is largely sufficient to strengthen the frequent service already provided; but the following fast trains may be noted:—

*From Central.*

12.20, 1.20, and 2.20 (Saturdays), 4.20, 5.20, and 6.20 (not Saturdays). Fast to the first station after Stoneford Junction, thence all stations to Johnstone.

12.50, 1.50, and 2.50 (Saturdays), 4.50, 5.50, and 6.50 (not Saturdays). Fast to the first station beyond Notbrook, thence all stations to Chillington.

12.28, 1.28, and 2.28 (Saturdays), 4.28, 5.28, and 6.28 (not Saturdays). Fast to Tillingford, thence stations to Steynbrook.

12.58, 1.58 (Saturdays), 4.58, 5.58 (not Saturdays). Fast to the first station beyond Ashford Junction, thence to Mannington.

*From Underground (Western Road).*

1.0, 2.0 (Saturdays), 5.0, 6.0 (not Saturdays). Through train to Johnstone. All stations on Underground, thence fast to Stoneford Junction.

1.15, 2.15 (Saturdays), 5.15, 6.15 (not Saturdays). Through train to Steynbrook. All stations on Underground, thence fast to the first station beyond Ashford Junction.

1.30, 2.30 (Saturdays), 5.30, 6.30 (not Saturdays). Through train to Exholme. All stations on Underground, thence fast to Weston.

1.45, 2.45 (Saturdays), 5.45, 6.45 (not Saturdays). Through train to Mannington. All stations on Underground, thence fast to the first station beyond Ashford Junction.

*From Osborn Street.*

1.7, 2.7 (Saturdays), 5.7, 6.7 (not Saturdays). Fast train to Chillington. Passing South Bentley train before Ashwell Junction, and non-stop to Ashford (stop to pick-up only), thence to Notbrook.

1.37, 2.37 (Saturdays), 5.37, 6.37 (not Saturdays). Fast to Johnstone. Passing South Bentley train before Ashwell Junction, and non-stop to Ashford (stop to pick-up only), thence to Stoneford Junction and all stations beyond.

1.23, 2.23 (Saturdays), 5.23, 6.23 (not Saturdays). Passing North Bentley train before Ashwell Junction, non-stop to first station beyond Ashford Junction, thence all stations to Steynbrook.

12.53, 1.53 (Saturdays), 4.53, 5.53 (not Saturdays). Passing North Bentley train before Ashwell Junction, non-stop to first station beyond Ashford Junction, thence all stations to Mannington.

The general result is that all the inner routes have a plentiful service of trains, light at slacker periods, and full length at others, and the longest interval even on the outer routes is one hour, and then only in the case of the Johnstone route beyond Stoneford Junction, and the Exholme and Chillington line. On the Joint Section between Weston and Exholme there are also West Midland trains, available by changing at Weston or Notbrook, there being a regular half-hourly service on this section with certain extras.

## No. VI.—Goods Traffic.

This phase does not permit of detailed consideration on the same lines as the passenger traffic, and therefore it is only necessary to indicate the main features. As the main passenger lines are very fully

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occupied, and it has not yet proved practicable to provide independent goods lines for the whole lengths of the main routes, the problem of the goods traffic is really the crux of the situation. It is not as if the Marsden Railway is mainly a passenger-carrying line. Indeed, its mineral traffic receipts about equal those of the passenger traffic, and there is considerable general merchandise and like traffic; and the fact that plentiful local services are required on the North and South Bentley routes, between Marsden and Rixford, Penton and Lowminster, and in a lesser degree between Farnworth and Heston, is an indication that these are busy industrial sections. Also that no fewer than four extensive sets of sorting sidings are called for near Rayhampton, three in the Ashford district, and one at Burn Road, shows that considerable volumes of traffic have to be dealt with. Of these sidings those towards Albert Park are mainly concerned with exchange traffic with the West Midland and West Haven Railways, both of these companies also working their own goods trains through to the North and South Bentley routes, but otherwise exchanging. The Burn Road sidings are somewhat smaller, and deal mainly with traffic of the western routes, but the railway works and carriage and wagon shops are also placed here, so that there is considerable traffic in the aggregate. A number of goods trains from the Johnstone and Chillington routes also proceed direct to Moortown *viâ* New Park.

The main Ashford goods sidings, on the Norford Junction side of the main line, deal with the heavy main line goods traffic; while the mineral sidings are devoted to that branch of traffic. A general principle is that long distance goods and mineral trains all converge upon one or other of these sorting sidings, and local goods trains thence distribute wagons. There are small sidings at Tillingford enabling a limited classification to be made there in regard to transfer to the Mannington branch and the Arklow Railway, also for intermediate stations thence to Ashford.

Otherwise all goods trains converge upon the respective sidings, complete through trains only going through intact, and distributing trains are run from these sidings to Moortown, and to the various routes. The busiest sections in this respect are the Ashford–Moortown, Albert Park–North and South Bentley, Ashford–North and South Bentley, and Ashford–Oxwell routes.

In the Marsden area there is a veritable maze of industrial establishments, collieries, etc., and at Rixford and Penton extensive exchange and sorting sidings dealing with traffic with the Northern and Easthampton Railways. South of Marsden are large sorting sidings where northern and southern traffic is made up or reformed.

Owing to the fact that the passenger lines are so fully occupied, and in view of the British characteristic that very long trains for specific destinations cannot often be made up, the practice has been developed of multiplying relatively light trains, rarely exceeding 300 or 350 tons loaded, and scheduling them fairly fast so that, in conjunction with the goods loops installed along the main lines at every second or third station and extending to the next station, the goods trains can be got along almost as fast as the stopping main line passenger trains.

Bearing in mind, too, the plenitude of the signalling, it is often quite practicable to run a goods train only 5 min. in advance of an express train, diverging at the next station to the goods loop, continuing along it without a check while the express passes it, and then following along the main line. This is readily done, although occupying the main line for two stations, where there is an interval between expresses of 10 min., providing the usual goods running speed of about 40 miles per hour is maintained.

It is, however, during the night that the bulk of the heavy goods is worked over the main lines, and then mineral trains are loaded up to 800 or 900 tons and worked by three locomotives, two in front and one in rear. The heavy routes are from Marsden and Seastone to Tillingford (here long trains are usually divided). Local goods trains, are usually worked by one Class D engine; but for the main line runs there are generally two Class C engines or one class C and one Class D, placed in front and rear; except in the case of the heavy night mineral trains, which are worked as stated above.

As already mentioned, the general practice is to use Class A engines only for the express runs, and in passenger service they are virtually confined to the Rayhampton–Rixford and Penton, Rayhampton–Belmont, Heston and Elverton, and Rayhampton-Alford-on-Sea routes. The Seastone and Lowminster connections, also the trains on all northern routes, and the Arklow, Johnstone, Chillington and similar through trains in the south, are all taken by Class B engines, though occasionally a Class A engine has



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incidentally to take similar duties. The Class C engines are also used to some extent, though they are primarily goods engines, and they are kept fairly strictly to the stopping trains if used for passenger traffic. Class E engines are used for shunting at all centres on the system.

Whenever two engines are placed together they are controlled on the multiple-unit principle by one man; and when of Marsden rolling stock providing for through connections to a rear locomotive, the two are similarly controlled. But in either case a man who is qualifying for driving and is "passed" as "second man" travels on the second engine. This second man becomes the driver when working Marsden–Penton and Stuart–Alford-on-Sea portions of express trains, and is qualified as such; but on the southward journey with these trains the chief motorman changes to the Penton or the Alford engine for the express run to Rayhampton.

When running with a single-engine set the locomotive is vestibuled to the leading coach, so that the guard can, if need be, obtain access while running, and these guards are required to be capable of taking control to meet an emergency. To provide for single-man operation a "dead-man's handle" gear is, of course, provided, both on locomotives and in control compartments.

For goods trains a rear engine is, of course, not controllable by the front engine, and therefore has its own motorman. There is, however, a considerable amount of braked or "piped" goods rolling stock, and this is largely used for the day goods trains, though it has not, even after this lapse of time, proved practicable to provide all goods stock with power brakes.

A large proportion of the locomotives are kept at work for about 20 hours each day, with two crews; and it is quite usual for engines to remain attached to coaches the whole time they are in service, working one way in front, and controlled from the rear the other way. A few instances of empty running between the terminus and carriage sidings are involved; but this applies mainly to the through Northern trains and specials. The main carriage sidings for Rayhampton are at Burn Road.

A few remarks in conclusion will fittingly close this account of the first railway of considerable size and traffic to be operated entirely by electric traction.

As mentioned in the second section, the power stations are equipped also to supply current for local purposes, apart from the railway company's operations. Electricity is also used very widely by the railway for purposes other than traction. Thus every station on the line is electrically illuminated; and every crane, except a few light ones at roadside depôts, is electric, the same applying to capstans, lifts and other equipment in the big goods yards and depôts. The Seastone docks are also entirely electrically operated, there being a magnificent equipment of coaling and other loading and unloading plants.

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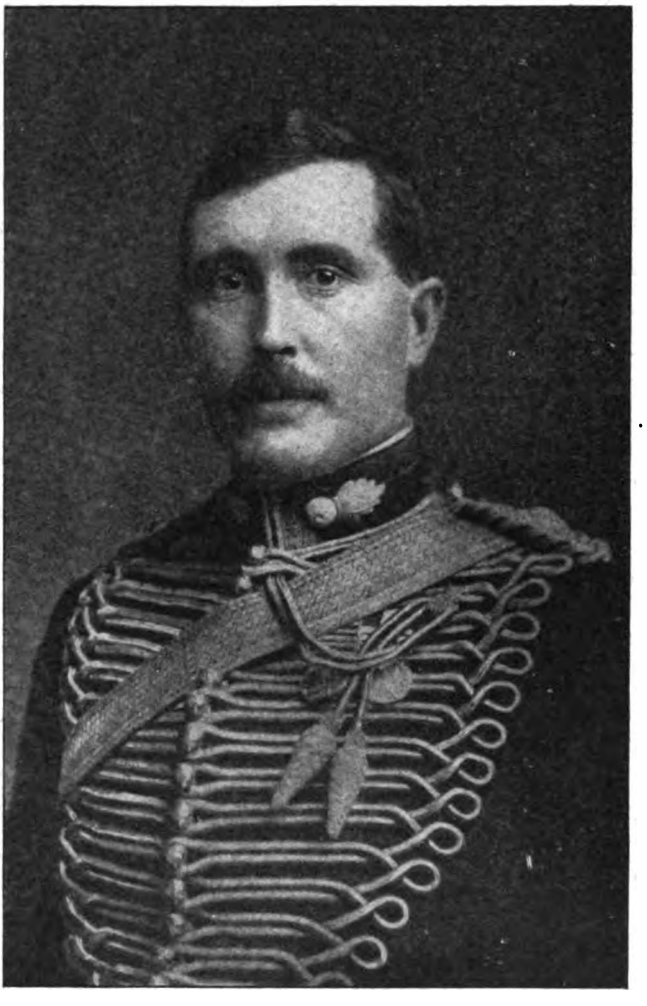
# British Railway Service and the War. [VIII.]

ONE of the lines which has had to deal with the most difficult transport problems occasioned by the War, is the South Eastern and Chatham Railway. Nevertheless, it has contributed its share of leading officers to His Majesty's Forces for Army duties, besides utilising many others in various ways in meeting the needs of the Army in the field, troops in training at home, the vast supplies of stores and munitions to be conveyed overseas, and the severe demands imposed by national and private industry. We have pleasure, therefore, in presenting portraits of several of the leading officers of the combined companies, who are now actively associated with army duties. First, however, it is necessary to mention that the well-known General Manager, Sir Francis Dent, member of the Railway Executive Committee, also holds the rank of Lieutenant-Colonel in the Engineer and Railway Staff Corps.



*Photo*] [*Elliott & Fry.*

LIEUT.-COL. H. C. T. HILDYARD, D.S.O.
Assistant Director of Railway Transport.
South Eastern and Chatham Railway Agent in Paris.

Portraits reproduced herewith are:—Lieut.-Col. H. C. T. Hildyard, D.S.O., the Managing Committee's Agent in Paris, who is Assistant Director of Railway Transport and has been mentioned in Despatches; Capt. F. Flood Page, R.E., Northern District Superintendent, in charge of the working of the Docks at Boulogne Base; Capt. J. S. F. Higginson, Royal Engineers, District Engineer; and Major J. S. Wilson, Royal Engineers, an assistant in the Audit Accountant's Dept., who has been mentioned in Despatches. Another chief officer, Capt. A. L. Wilson, Assistant Veterinary Surgeon, is serving with the Army Veterinary Corps.

The following assistants in the Traffic Department may also be mentioned:—Capt. L. W. S. Grinling, R.E., Railway Transport Officer; Capt. E. F. E. Livesey, R.E., Railway Transport Officer; Lieut. C. Grasemann, R.E.; and Capt. R. M. T. Richards, R.E.

A number of the pupils attached to various departments are now or have been serving with His Majesty's Forces, and some of whom have given their lives, may also be mentioned:—Lieut. A. G. G. Elliott, Gloucester Regiment; R. T. Cranefield, Hon. Artillery Company; 2nd Lieut. A. H. Blair, East Lancashire Regiment; 2nd Lieut. H. W. P. Sarson, King's Own



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[Photo] [Elliott & Fry.

CAPT. F. FLOOD-PAGE.

Royal Engineers.
Northern District Superintendent: South Eastern and Chatham Railway.

Yorkshire Light Infantry (killed); 2nd Lieut. T. Stanyon, Welsh Regiment (died of wounds); 2nd Lieut. C. W. G. Britts, East Surrey Regiment (killed); 2nd Lieut. H. S. Spurling, East Surrey Regiment (killed); 2nd Lieut. G. W. P. Avery, Army Service Corps; Lieut. R. M. McIver, Royal Engineers; 2nd Lieut. F. R. Offord, Munster Fusiliers; 2nd Lieut. E. Jepson, Royal Garrison Artillery; 2nd Lieut. A. S. R. Hughes, South Staffordshire Regiment (wounded).

Further, it may be mentioned that up to and including July 31st, 1916, 3,243 of the Managing Committee's Staff had joined His Majesty's Forces, and of these 159 have been killed in action or died of wounds, 406 wounded, 19 missing, and 25 prisoners of war. Three members of the Staff hold Commissions in the Royal Navy, and 36 in the Army.

A feature of the special developments occasioned by the great war now progressing is the large number of leading railway officers whose services have been "commandeered" by the Government, and particularly by various branches of the Ministry of Munitions and similar bodies. Of these Mr. Henry Fowler, Chief Mechanical Engineer, Midland Railway, is a particular instance of the valuable services rendered by the engineers of our railways. He had scarcely settled down under his new designation of Deputy-Controller of Shell Manufacture, when called upon by the Minister of Munitions, acting on the advice of Lord Curzon of Kedleston, to take up the duties of the new appointment of Superintendent of the Royal Aircraft Factory at Farnborough. Mr. Fowler received his technical training at Mason's College, Birmingham, which afterwards became Birmingham University. His first railway appointment was with the Lancashire and Yorkshire Railway at their Horwich works, where he served his apprenticeship, and eventually succeeded Mr. George Hughes both as chief of the testing department and as gas engineer. He left in 1900 to take up the position of gas engineer under the Midland Railway Company at Derby. In 1905 he was appointed assistant works manager at Derby; and in May, 1907, he was

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promoted to be works manager. It was in January, 1910, that he received the appointment of Chief Mechanical Engineer.

Another important appointment is that of Sir Eric Geddes, Deputy-General Manager of the North Eastern Railway until he became Director-General of Munitions Supply on the formation of the Ministry of Munitions, who now takes the title of Director-General of Military Railways and deputy to the Quartermaster-General in matters affecting transport services.

The total number of Great Central Railway men who have joined the Colours is now over 7,000. The list of killed, wounded, missing and prisoners of war is a long one. The numbers ending August are: killed, died of wounds and other causes, 356; wounded, 768; missing, 53; prisoners of war, 44. Total casualties, 1,221. The foregoing do not include the crews of the Great Central steamers interned in Germany.

Following its lead in the extensive employment of women as goods checkers, loaders and porters, the South Eastern and Chatham Railway has now commenced the employment of women carters in London. The women were selected for this duty after a training on the platform at Bricklayers' Arms station, and given a further training as vanguards and station carters. It will be noted from the view reproduced on page 352 that the uniform prescribed for them is of a serviceable and smart character.

CAPT. J. S. F. HIGGINSON.
Royal Engineers.
District Engineer: South Eastern and Chatham Railway.

Pte. L. Rowland, of the Royal Warwicks, has been wounded in action in France, and is now in Lord Derby's War Hospital, Warrington. He is the son of Mr. A. Rowland, Superintendent of Passenger Service, Midland Railway, and before joining the forces was on the clerical staff of the Chief Engineer (Mr. Worthington).

A new list of members of the staff of the London and North Western Railway holding commissions in His Majesty's Forces has been compiled, and although we have already given many of these names, the list is one of considerable interest, and for purposes of record may appropriately be reproduced.

*General Manager's Department.*—F. A. Pope, Lieut., Royal Engineers; A. E. Wilson, Lieut., Royal Engineers; C. H. Carter, Lieut., West Yorkshire Regiment; F. W. Eaton, 2nd Lieut., Middlesex Regiment; C. C. Seear, Lieut., Royal Engineers; C. S. Douglas, Lieut., Royal Engineers; A. J. Rice, 2nd Lieut., London Regiment, *Secretary's Department.*—W. J. Parsons, Travelling Auditor, Lancaster, Captain,

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King's Own Royal Lancasters; V. B. Horsley, 2nd Lieut., Royal Fusiliers; L. B. Powell, 2nd Lieut., Royal Engineers; H. J. Salter, 2nd Lieut., Royal Fusiliers; H. Hadley, Sub-Lieut., Royal Naval Division; 2nd Lieut., Royal Flying Corps. *Solicitor's Department.*—H. L. Thornhill, Solicitor, Major, Royal Engineers; R. Almack, Solicitor, Captain, Royal Engineers; H. R. Hudleston, Solicitor, 2nd Lieut., Middlesex

*Photo*] [*Vor Butin, Hazelbrouck.*

MAJOR J. S. WILSON.

Royal Engineers.

Audit Accountant's Department: South Eastern and Chatham Railway.

R. W. Fox, 2nd Lieut., Manchester Regiment; H. D. Peabody, 2nd Lieut., London Regiment; H. R. North, Lieut., Royal Welsh Fusiliers; W. Bowles, 2nd Lieut., East Lancashire Regiment; T. E. Drowley, Regiment, killed in action. *Locomotive Department.*—H. P. M. Beames, Assistant to Chief Mechanical Engineer and Works Manager, Crewe, Captain, Royal Engineers, released from Army to resume with

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Company; E. Price-Jones, Assistant to Works Manager, Crewe, Lieut., Royal Engineers, resumed with Company; F. D. Earl, Assistant to Works Manager, Crewe, Lieut., Oxford and Bucks. Light Infantry; G. J. Louis, Assistant to Running Superintendent, Crewe, Captain, Army Service Corps, killed in action; E. G. Purser, Assistant to Running Superintendent, Crewe, Captain, Royal Engineers; T. Lawrence, Assistant to Running Superintendent, Crewe, Lieut., Army Service Corps; H. G. Ivatt, Assistant Out-door Department, Crewe, Lieut., Army Service Corps; G. R. Jackson, Assistant to Road Motor Superintendent, Crewe, Captain, Army Service Corps; E. H. Furber, Draughtsman (Pupil), Crewe, 2nd Lieut., Royal Field Artillery; R. H. Williams, Premium Apprentice, Crewe, Lieut., Royal Engineers; H. N. E. Fielden, Crewe, Lieut., Welsh Regiment; W. G. Hinds, Pupil, Crewe, Captain, Royal Field Artillery; M. Howkins, Premium Apprentice, Crewe, Lieut., Royal Horse Artillery, killed in action; W. Warneford, Premium Apprentice, Crewe, Flight-Lieut., Royal Naval Air Service; W. G. Taylor, Crewe, Lieut., Army Service Corps; M. W. Turner, Premium Apprentice, Crewe, Lieut., Royal Garrison Artillery; H. J. Seeds, Pupil, Crewe, 2nd Lieut., Royal Field Artillery; P. S. Ransom, Premium Apprentice, Crewe, 2nd Lieut., Army Service Corps; W. H. Power, Assistant Foreman, Crewe, Lieut., Machine Gun Corps; A. L. Butcher, Premium Apprentice, Crewe, 2nd Lieut., Durham Light Infantry; J. R. Brookes, Premium Apprentice, Crewe, 2nd Lieut., Royal Fusiliers; R. F. W. Eardley, Pupil, Crewe, Lieut., Royal Engineers; F. R. Parker, Premium Apprentice, Crewe, 2nd Lieut., Wilts Regiment, killed in action; L. H. Oldham, Premium Apprentice, Crewe, 2nd Lieut., Worcester Regiment, killed in action; H. W. M. Jones, Draughtsman, Crewe, Lieut., Army Service Corps; E. V. M. Powell, Draughtsman, Crewe, Lieut., Army Service Corps; G. W. Toogood, Draughtsman, Crewe, 2nd Lieut., Royal Engineers; A. G. Englefield, Crewe, 2nd Lieut., Royal Garrison Artillery; H. F. Evans, Premium Apprentice, Crewe, 2nd Lieut., Royal Horse Artillery; J. W. Phillips, Draughtsman, Crewe, 2nd Lieut., Royal Engineers, attached to Royal Flying Corps; D. W. Ostle, Premium Apprentice, Crewe, 2nd Lieut., Army Service Corps: C. Vance, Crewe, 2nd Lieut., Cheshire Regiment, killed in action; T. R. Burnett, Crewe, 2nd Lieut., Cyclist Battalion; E. A. Robinson, Premium Apprentice, Crewe, Lieut., Royal Engineers; N. H. Thornton, Premium Apprentice, Crewe, Lieut., Royal Engineers; J. D. Bird, Premium Apprentice, Crewe, 2nd Lieut., Royal Engineers; J. N. M. Briers, Pupil, Crewe, 2nd Lieut., Royal Engineers; W. R. Abbott, Premium Apprentice, Crewe, Sub-Lieut., Royal Naval Volunteer Reserve; V. J. M. Green, Draughtsman, Crewe, Lieut., Royal Engineers, killed in action; T. Hannon, Premium Apprentice, Crewe, 2nd Lieut., Royal Engineers; W. C. Wheatley, Premium Apprentice, Crewe, 2nd Lieut., Rifle Brigade; D. T. Duff, Crewe, 2nd Lieut., Royal Engineers; G. H. Nelson, Loco. Foreman, Preston, Lieut., Royal Field Artillery; J. E. V. Denning, Foreman, Birkenhead, 2nd Lieut., King's Liverpool Regiment; A. W. Bruce-Joy, Assistant Foreman, Rugby, 2nd Lieut., Royal Engineers; W. M. Chambers, Rugby, 2nd Lieut., Cheshire Regiment; A. F. Tabraham, Rugby, 2nd Lieut., Royal Engineers; G. E. Middleditch, Premium Apprentice, Rugby, Lieut., Oxford and Bucks Light Infantry; H. Mansfield, Junior Clerk, Rugby, 2nd Lieut., Cheshire Regiment, killed in action; K. de R. Calthrop, Willesden, Captain, Essex Regiment; S. N. Cole, Apprentice, Willesden, Flight-Lieut., Royal Flying Corps; H. K. Bostock, Assistant Foreman, Longsight, 2nd Lieut., Royal Engineers. *Goods Department.*—K. E. Candy, Probationer, Harrow, 2nd Lieut., Lancashire Fusiliers; W. F. Roach, Junior Clerk, Shrewsbury, 2nd Lieut., South Lancashire Regiment; C. H. Tait, Assistant to Out-door Goods Manager, Manchester, Staff Captain, War Office; J. McLachlan, 2nd Out-door Assistant, Dublin, Captain, Royal Engineers; E. O. Humphreys, Dublin, 2nd Lieut., Royal Irish Regiment; I. R. Pogose, Broad Street, 2nd Lieut., London Regiment, killed in action; L. Hales, Chester, Captain, Royal Fusiliers; A. H. Myers, Cartage Assistant, Manchester, Lieut., Army Service Corps; K. M. Dawson, Probationer, Rhyl, Lieut., Royal Flying Corps; R. P. Sorge, Llanberis, 2nd Lieut., Royal Welsh Fusiliers; C. Jones, Assistant District Superintendent, Bangor, Captain and Adj., Royal Welsh Fusiliers; J. T. Jones, Chester (Shropshire Union), 2nd Lieut., Army Service Corps; L. G. Burleigh, Curzon Street, 2nd Lieut., Highland Light Infantry; H. M. Sifton, Abergavenny, Lieut., Monmouth Regiment; N. L. Ross, Curzon Street, Lieut., South Lancashire Regiment; A. T. Orr,

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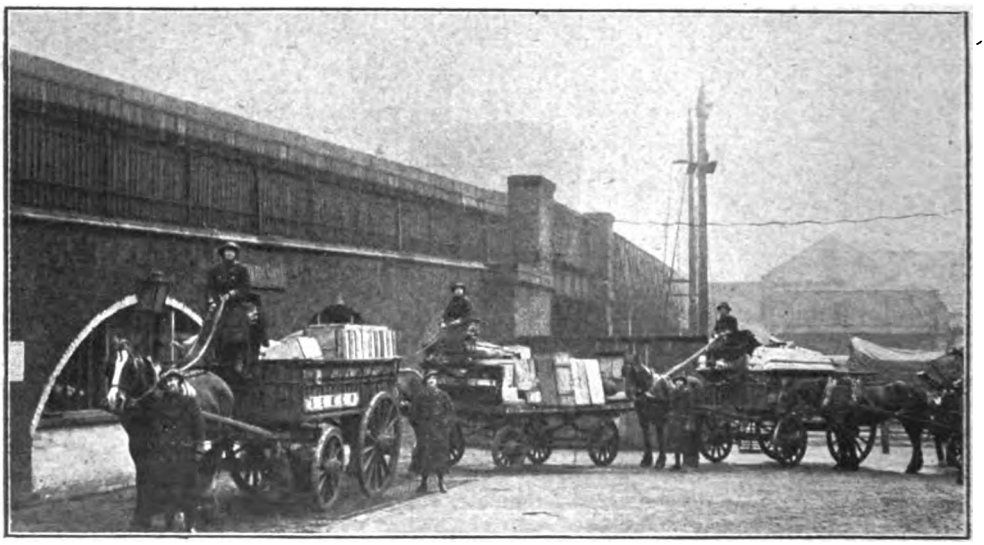
Probationer, Ruthin, Lieut., Royal Welsh Fusiliers; T. G. Fitzpatrick, Clerk (Wages), Dublin, Captain, Royal Irish Fusiliers, killed in action; T. A. Moffet, Probationer, Waterloo, Lieut., Royal Engineers; W. Goulden, Edge Hill, Lieut., King's Liverpool Regiment; J. L. D. Williamson, Probationer, Broad Street, Captain, East Yorkshire Regiment; H. W. Bostock, Out-door Clerk, Euston, 2nd Lieut., South Staffs. Regiment, killed in action; D. S. Inman, Probationer, Manchester, 2nd Lieut., Cheshire Regiment; E. Jones, Euston, 2nd Lieut., Royal Welsh Fusiliers; H. P. Aggleton, Junior Assistant, Lancaster, Captain, Royal Engineers; C. S. Kerrison, Mosley Street, 2nd Lieut., Royal Fusiliers (City of London); W. S. Rivers, Curzon Street, Lieut. and Q.-Mas., Royal Army Medical Corps; G. R. Fryer, Willesden, 2nd Lieut., Lancashire Fusiliers; M. A. Jolly, Willesden, Lieut., Middlesex Regiment, on reserve owing to ill-health, resumed with Company; R. Higginson, Lancaster, 2nd Lieut., King's Own Royal Lancasters, missing; E. H. Williams, Euston, A.G.M.O., 2nd Lieut., Royal Field Artillery; F. D. Dams, Wolverhampton, 2nd Lieut., West Yorkshire Regiment; R. W. G. Bennett, Aston, Lieut. and Q.-Mas., Royal Army Medical Corps; J. H. G. Moses, Chief Canvasser, Bradford, Lieut., Brigade Q.-Mas.,



WOMEN CARTERS AT BRICKLAYERS' ARMS GOODS DEPÔT, SOUTH EASTERN AND CHATHAM RAILWAY.

Junior Clerk, Dublin (North Wall), 2nd Lieut., Royal Garrison Artillery; C. W. V. Webb, Abergavenny, 2nd Lieut., King's Shropshire Light Infantry; G. W. Waterlow, Assistant Manager, Waterloo, D.G.M.O., Lieut., Army Service Corps; A. E. Bennett, Assistant Foreman, Canada Dock, Lieut. and Q.-Mas., Argyle and Sutherland Highlanders; A. E. Young, Probationer, Falcon Lane, 2nd Lieut., London Regiment, killed in action; M. A. Sargent, Probationer, Willesden, Sub-Lieut., Royal Naval Air Service; H. Skillington, Northampton, D.G.M.O., 2nd Lieut., Northants Regiment, attached Royal Warwick Regiment, killed in action; J. J. Bishop, Willesden, 2nd Lieut., Middlesex Regiment; W. Richards, Dragoons; W. O. Davies, Chief Transhipment Inspector, Crewe, 2nd Lieut., Royal Garrison Artillery; C. D. Mitchell, Abergavenny, D.T.S.O., 2nd Lieut., Royal Field Artillery; E. H. Aston, Wolverhampton, D.G.M.O., 2nd Lieut., Staffordshire Regiment; L. Edmonds, Euston, 2nd Lieut., Royal West Kent Regiment; E. E. Barrs, Northampton, Castle, 2nd Lieut., Royal Field Artillery; R. E. Jenkinson, Liverpool, 2nd Lieut., Cheshire Regiment; J. Huyton, Leeds, D.G.M.O., 2nd Lieut., North Staffs. Regiment; H. Viner, Goods Agent, Stockport, 2nd Lieut., Royal Engineers; R. Grigg, Leeds, D.G.M.O., 2nd Lieut., King's Own Yorkshire Light Infantry; H. Kilner, Edge Hill, 2nd Lieut., Manchester Regiment;

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F. L. Morris, Chester, D.T.S.O., 2nd Lieut., Royal Welsh Fusiliers; E. W. Powell, Broad Street, 2nd Lieut., Monmouth Regiment; F. H. H. Ivens, Ebbw Vale, 2nd Lieut., Royal Sussex Regiment; H. M. Medcraft, Boxmoor, 2nd Lieut., Royal Warwickshire Regiment; H. G. Swaffield, Camden, 2nd Lieut., London Regiment; J. R. Pike, Probationer, Waterloo, Sub-Lieut., Royal Naval Volunteer Reserve; A. E. Chick, Euston, A.G.M.O., 2nd Lieut., Northants Regiment; A. Small, Broad Street, 2nd Lieut., Middlesex Regiment; H. M. Haywood, Euston, C.G.M.O., 2nd Lieut., Hussars; S. I. James, Brompton and Fulham, 2nd Lieut., Royal Sussex Regiment; B. St. L. Ten-Broeke, Probationer, Waterloo, D.G.M.O., 2nd Lieut., Dorsetshire Regiment; J. F. Bolton-Smith, Chester, 2nd Lieut., Royal Flying Corps.

*Traffic Department.*—R. Banks, Out-door Assistant, Chester, Staff Captain, Royal Engineers; W. P. Bradbury, Euston, Captain, Royal Engineers; N. M. C. Dudley, Euston, 2nd Lieut., King's Liverpool Regiment; F. E. Hills, Probationer, Euston, 2nd Lieut., Royal Garrison Artillery; G. Hussey, Probationer, Euston, 2nd Lieut., Royal Engineers; H. W. Perkins, Out-door Assistant, Birmingham, Major, Royal Engineers; J. N. Phillips, Out-door Assistant, Manchester, 2nd Lieut., Royal Engineers; J. P. Reed, Euston, Lieut., Yorkshire Regiment; C. E. Rhodes, Euston, 2nd Lieut., Royal Engineers; M. C. Robson, Out-door Assistant, Birmingham, Lieut., Royal Engineers; E. B. Shaw, Euston, 2nd Lieut., London Regiment; J. Shearman, Out-door Assistant, Crewe, Captain, Army Service Corps; R. O. Squarey, Out-door Assistant, Euston, Captain, Royal Engineers; D. M. Turnbull, Out-door Assistant, Manchester, Lieut., Royal Engineers; G. V. Bernays, Probationer, Watford, 2nd Lieut., Middlesex Regiment; F. le B. Croke, Probationer, Euston, Lieut., Royal Engineers; G. N. Ford, District Superintendent, Euston, Major, London Regiment; H. C. Givan, Probationer, Willesden, 2nd Lieut., Royal Warwickshire Regiment; A. G. Gwyn, Euston, 2nd Lieut., Army Service Corps; E. S. Hunt, Probationer, Willesden, Sub-Lieut., Royal Naval Air Service; A. P. Hunter, Probationer, Watford, Staff Lieut., Royal Engineers; G. C. Lomax, Addison Road, Lieut., Royal Engineers; A. Ludlow, Parcel Clerk, Euston, 2nd Lieut., Army Service Corps; W. M. Miller, Probationer, Kilburn, Sub-Lieut., Royal Naval Volunteer Reserve; S. E. Parkhouse, Assistant District Superintendent, Euston, Lieut., Royal Engineers; J. Ree, Probationer, Watford, Flight Sub-Lieut., Royal Naval Air Service; K. A. Robinson, Pinner, Lieut., Royal Irish Rifles; A. V. W. Sheperd, Probationer, Watford, 2nd Lieut., Royal Munster Fusiliers; A. L. Tompkins, Booking Clerk, Newport Pagnell, 2nd Lieut., Oxford and Bucks. Light Infantry; H. C. Trench, Probationer, Harrow, Lieut., Army Service Corps; E. H. Vigars, Rugby, 2nd Lieut., Oxford and Bucks. Light Infantry; C. J. Vidal, Probationer, Oxford, 2nd Lieut., Oxford and Bucks. Light Infantry; R. H. M. S. Saundby, Probationer, Kenilworth, 2nd Lieut., Royal Flying Corps; D. M. Williams, Birmingham, 2nd Lieut., Royal Welsh Fusiliers; S. T. Beard, Passenger Guard, Abergavenny Junction, Lieut. and Q.-Mas., Royal Army Medical Corps; J. D. A. Findlay, Probationer, Swansea, D.S.O., Lieut., Durham Light Infantry; C. J. Cowley, Signalman, Dunvant, Captain, Welsh Regiment; G. H. L. Allen, Probationer, Mossley Hill, Lieut., Royal Engineers; A. F. Behrend, Probationer, Lime Street, 2nd Lieut., Royal Garrison Artillery; H. Green, Lime Street, 2nd Lieut., Loyal North Lancashires; H. H. Grindley, Assistant to Superintendent, Lime Street, Captain, Royal Engineers; E. Lee, Lime Street, 2nd Lieut., Army Service Corps; R. T. Greaves, Telegraph Clerk, Huddersfield, Captain, Royal Engineers; I. H. Ingleby, Probationer, Cheadle Hulme, Lieut., Grenadier Guards; H. E. M. Isham, Probationer, Wilmslow, 2nd Lieut., Royal Warwickshire Regiment; A. F. R. Linaker, Manchester, Exchange, 2nd Lieut., South Lancashire Regiment; A. G. Marsden, Probationer, Manchester, Captain, Manchester Regiment; A. S. Edwards, Menai Bridge, Captain, Royal Welsh Fusiliers; W. S. Hughes, Chester, D.J.S.O., Sub-Lieut., Royal Naval Volunteer Reserve; G. C. W. O'Carroll, Bangor, 2nd Lieut., Duke of Cornwall's Light Infantry; L. B. Shoppee, Assistant to District Traffic Superintendent, Chester, Captain, Royal Engineers; A. D. Thurstan, Lancaster, Lieut., Royal Engineers; E. L. Bennett, Lancaster, 2nd Lieut., Royal Lancaster Regiment; L. S. Hogg, Probationer, Kensington, Captain and Adj., Royal Welsh Fusiliers, killed in action; E. J. Druitt, Probationer, Harrow, 2nd Lieut., Berkshire Regiment, killed in action; F. P. Isaac, Probationer, Shrewsbury, 2nd Lieut., King's Shropshire Light Infantry.

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killed in action; F. Watson, Probationer, Bangor, 2nd Lieut., East Surrey Regiment, killed in action. *Engineering Department.*—F. J. Paice, Staff Assistant, Euston, Lieut.-Commander, Royal Naval Volunteer Reserve; G. Whale, Engineering Assistant, Euston, Sub-Lieut., Royal Naval Air Service; G. F. Trench, Resident Engineer, Coventry, Lieut., Royal Engineers; H. A. Hull, Resident Engineer, Coventry, Lieut.-Finlayson, Engineering Assistant, Coventry, Captain, Royal Warwickshire Regiment; A. G. Smith, Steelwork Assistant, Euston, Lieut., Royal Naval Volunteer Reserve; C. E. Farran, Engineering Assistant, Kilburn, Lieut., Royal Engineers; H. Lee, Draughtsman, Euston, 2nd Lieut., Royal Engineers; H. E. Footner, Resident Engineer, Llandulas, Captain, Royal Garrison Artillery, killed in action; H. W. Dann, Quantity

MAJOR H. L. THORNHILL, R.E.
Assistant Solicitor: London and North Western Railway.

Col., North Staffs. Regiment, resumed with Company owing to ill-health; S. O. Cotton, Resident Engineer, Kilburn, 2nd Lieut., Royal Engineers; W. H. Gyles, Resident Engineer, Longsight, 2nd Lieut., Royal Engineers; F. G. T. Adams, Resident Engineer, Warrington, Lieut., Royal Engineers; G. Bolsover, Draughtsman, Euston, Captain, Royal Garrison Artillery; A. R. Surveyor, Euston, 2nd Lieut., Royal Engineers; S. G. Thompson, Engineering Assistant, Warrington, 2nd Lieut., Royal Engineers; E. J. P. Marson, Engineering Assistant, Bushey, 2nd Lieut., Royal Engineers; J. H. T. Wroughton, Draughtsman, Euston, 2nd Lieut., Royal Engineers; J. W. Stansby, Clerk, Coventry, 2nd Lieut., North Staffs. Regiment; W. E. Thornhill,

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Divisional Engineer, Crewe, Captain, Royal Engineers; H. K. S. Woodhouse, Draughtsman, Crewe, Major, King's Liverpool Regiment; P. R. Worrall, Draughtsman, Crewe, 2nd Lieut., Cheshire Regiment; W. D. Cooil, Joiner, Bangor, 2nd Lieut., Royal Garrison Artillery; E. L. Ferrier, Draughtsman, Bangor, 2nd Lieut., Royal Fusiliers, resumed with Company owing to ill-health; F. Baxter, Chief Draughtsman, Camden Town, 2nd Lieut., Royal Engineers, attached Royal Flying Corps; R. E. Bullough, Draughtsman, Crewe, 2nd Lieut., Royal Engineers; S. F. Walker, Draughtsman, Bangor, 2nd Lieut., King's Own Royal Lancaster Regiment; J. Norquoy, Draughtsman, Euston, Captain, Middlesex Regiment; P. Carnelly, Draughtsman, Edge Hill, 2nd Lieut., King's Liverpool Regiment; D. B. Evans, Abergavenny, 2nd Lieut., Monmouthshire Regiment; H. Holland, Draughtsman, Euston, 2nd Lieut., Cheshire Regiment. *Carriage Department.*—H. M. Williams, Assistant Superintendent (Outdoor), Wolverton, Lieut.-Col., Oxford and Bucks. Light Infantry, resumed with Company; C. L. Mason, Assistant Superintendent (Indoor), Wolverton, Captain, Royal Engineers; J. J. T. Rose, Wolverton, 2nd Lieut., Oxford and Bucks. Light Infantry. *Horse Department.*—H. Quiggin, Assistant, Manchester, Lieut., Army Veterinary Corps; S. Jackson, Junior Assistant, Manchester, 2nd Lieut., Royal Field Artillery. *Electrical Department.*—F. A. C. Leigh (T.D.), Chief Electrical Engineer, Euston, Lieut.-Col., Royal Engineers; P. D. Michod, Assistant, Euston, Captain, Royal Engineers; R. Le Mare, Euston, 2nd Lieut., Royal Irish Fusiliers; S. J. Snowdon, Junior Assistant, Euston, Lieut., Middlesex Regiment; H. J. Hill, Sub-Inspector, Stafford, Lieut., Royal Engineers; C. N. Heath, Junior Assistant, Euston, Captain, Royal Engineers; G. B. Cross, Junior Assistant, Euston, Staff Lieut., Royal Engineers; N. S. Edmondstone, Pupil, Stonebridge Park, 2nd Lieut., London Regiment; D. G. Harrison, Junior Assistant, Euston, 2nd Lieut., Royal Flying Corps. *Marine Department.*—G. E. Holland, Superintendent, Holyhead, Colonel, Royal Engineers; I. P. C. Sorge, Holyhead, 2nd Lieut., Border Regiment; R. Riley, Holyhead, Lieut., Royal Engineers; H. J. Gill, 2nd Officer, Holyhead, Captain, Royal Engineers; E. D. Farr, 2nd Officer, Holyhead, Captain, Royal Engineers; W. H. Owen, Clerk, Holyhead, Captain, Royal Engineers; R. E. J. Parsons, Clerk, Holyhead, Lieut., Royal Engineers; A. A. Mackenzie, 2nd Officer, Holyhead, Captain, Royal Engineers; E. B. Turner, Chief Officer, Holyhead, Lieut., Royal Engineers. *Rolling Stock Department.*—M. W. Brown, Assistant Superintendent, Crewe, Captain, Royal Engineers; C. E. Chadwick, Crewe, Lieut., Army Ordnance Corps. *Police Department.*—T. H. P. King, Camden, Lieut., East Lancashire Regiment; B. H. H. Strath, Birmingham, New Street, 2nd Lieut., Royal Irish Regiment. *Estate Department.*—J. R. Worrall, District Assistant, Birmingham, New Street, Lieut., Gloucester Regiment; W. M. Groom, Euston, 2nd Lieut., Royal Flying Corps; W. H. Sendall, Junior Clerk, Euston, 2nd Lieut., London Regiment; H. D. Baldwin, Draughtsman, Euston, 2nd Lieut., Royal Field Artillery; J. P. Ellsmoor, Draughtsman, Liverpool, 2nd Lieut., King's Royal Rifles; A. H. Hitch, Chief Assistant, Broad Street, Lieut., Army Service Corps.

By the courtesy of the *L. & N.W.R. Gazette* a portrait is reproduced of Major H. B. Thornhill, R.E., Assistant Solicitor to the London and North Western Railway, and second son of the late Mr. E. B. Thornhill, Chief Engineer of the Company. Major Thornhill was born on March 23rd, 1877, and was articled as a solicitor to the late Mr. Charles Henry Mason, the then Solicitor to the Company. He was admitted a solicitor, and entered the Company's service in April, 1899, practising in the various branches of the legal profession. At the outbreak of the war he was chiefly engaged on cases in the Railway and Canal Commissioners Court, and shipping cases. As soon as Major Thornhill could be spared from his legal work—January 18th, 1915—he took a commission in the Army Service Corps, but afterwards transferred to the Royal Engineers, with the rank of Captain, under Colonel and Commander Holland, D.S.O., the Company's Marine Superintendent. On May 22nd, 1916, he was appointed Assistant Solicitor to the London and North Western Railway, though this appointment is necessarily in abeyance for the time being; and on January 12th, 1916, he was gazetted as Major.

In the same section of the Royal Engineers are Capt. R. Almack and Corp. Marples, both members of the Solicitor's Staff.

The London and North Western Railway Rest Room at Holyhead for soldiers and sailors was opened on June 5th, 1915. From

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June to December, 1915, over 18,000 men used the Room, and in the next six months this number had increased to 32,000. During the week of the Irish Rebellion, the one room was found to be quite unequal to the requirements, and the General Waiting Room had to be added. The latter was served by the Holyhead Voluntary Aid Detachment, and the Red Cross Society generously defrayed the expenses in connection with the Room for the week. The balance-sheet shows that donations received for the half-year ending June 30th, 1916, amounted to the considerable sum of £78, and the Committee express their appreciation of the help rendered to the good work by the London and North Western Railway Company, and their officials, in providing them with free quarters, supplies of coal, etc., and in many other ways.

WAR-TIME CHANGES ON THE GLASGOW AND SOUTH WESTERN RAILWAY.
Women engine cleaners at Princes Pier (Greenock) depôt.

Further honours earned by Great Western Railway employés may be referred to. His Majesty the King has been pleased to award the Military Medal to Corpl. E. Weaving, Gloucester Regiment (formerly leading packer in the Engineering Department, Gloucester), for bravery in the field. Corpl. Weaving, who is 33 years of age, had been in the Company's service 14 years. He was recently reported wounded in action in France. The General Officer Commanding in Chief has awarded the Military Cross to 2nd-Lieut. J. V. B. Wood, South Wales Borderers (District Goods Manager's Office, Birmingham, Great Western Railway), for an act of gallantry.

A supplement to the *London Gazette* notifies that the Marquis of Bute, Chairman of the Cardiff Railway, from an Officers' Cadet Corps, has been appointed second lieutenant (on probation) in the Welsh Regiment.

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# Staff Changes on the Great Western Railway.

AFTER a period of forty-three years' service, Mr. H. J. Saunders, Canal Engineer, Great Western Railway, has retired through the age limit. Entering the service at the age of twenty-three in 1873 as an assistant at Tondu to the Newport Divisional Engineer, Mr. Saunders took charge of the Llynvi and Ogmore and Ely Valley branches, including supervision of the Porthcawl dock and breakwater, and in 1895, on the closing of the Tondu office, he was appointed Superintendent of the Monmouthshire, Brecon and Abergavenny Canal, with offices at Bridgend. In 1899, consequent on the death of Mr. Hudson, the manager of the Stratford-on-Avon Navigation, and the retirement of Mr. R. W. Merriman and Mr. C. F. Hart, respectively Secretary and Manager of the Kennet and Avon Canal, Mr. Saunders was designated Canal Assistant Engineer, and placed in charge of the Bridgwater and Taunton, Grand Western, Kennet and Avon, Monmouthshire, Brecon and Abergavenny, Stourbridge Extension and Stratford-on-Avon Canals, with headquarters at Bath, while the administration of the Swansea Canal was added in 1905 on the retirement of Mr. T. R. White, the then Engineer-in-charge. Mr. Saunders' retirement severs what is one of the oldest existing links with the early days of the Great Western Railway, his uncle, the late Mr. C. A. Saunders, having been appointed Secretary to the London Committee in 1833—some three years before the opening of the line—while his cousin, the late Mr. F. G. Saunders, succeeded Sir Daniel Gooch as Chairman in 1889.

To succeed Mr. Saunders the Directors have appointed Mr. A. G. Smith as Canals Manager. His service in the engineering department extends over a period of thirty-four years, first at Newport and then at Paddington, where for the last twenty years he has been respectively Chief Clerk and Office Assistant to the Chief Engineer. Among Mr. Smith's outside activities none are better known nor more widely appreciated than his services to the Railway's Temperance Union, and also to that very popular institution, the Great Western Railway Literary Society.

MR. H. J. SAUNDERS.
Late Canals Engineer: Great Western Railway.

MR. A. G. SMITH.
Canals Manager: Great Western Railway.

Mr. John Armstrong, London Divisional Locomotive and Carriage Superintendent, Great Western Railway, has retired on the completion of half-a-century's service. A second son of the late Mr. Joseph Armstrong, who succeeded Sir Daniel Gooch as Locomotive Superintendent, and nephew of the late Mr. George Armstrong, late Superintendent of the Northern Division of the Locomotive Department, he entered Swindon Works in 1864, and after acquiring a thoroughly practical acquaintance of locomotive engineering, was appointed, in 1878, District Superintendent at Swindon, subsequently obtaining further experience in the South Wales and South Devon districts. In 1883 he became Superintendent of the London Division, with charge of the Carriage Department in the section



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between West Drayton and Aylesbury, and in 1889 the remainder of the division was placed under his control. Since that time the growth of the London Division has been almost phenomenal, and to-day—although it is not actually the largest—it is perhaps the most important locomotive centre on the system. During the time Mr. Armstrong has been at Paddington he has had charge of the Royal train, and it stands to his credit that in all the Royal journeys, which include the Jubilee celebration trips from and to Windsor, the funerals of Queen Victoria and King Edward, and the welcome home of Lords Roberts and Kitchener, there was no hitch throughout that period. What, perhaps, was Mr. Armstrong's biggest task during his term of office was associated with the transfer, in 1906, in connection with the scheme known as Paddington Improvements, of the London locomotive depôt from Westbourne Park to Old Oak Common, where the engine shed alone contains four 65-ft. turntables, each equipped with 28 radiating roads, representing a total of 112 engine pits. Mr. Armstrong's interest in the employés of the Locomotive Department did not end with his business hours, as his long and devoted interest in the Great Western Railway Temperance Union, as Chairman of its Council, testifies. He was the founder and President of the Old Oak Common Railwaymen's Temperance Institute, the centre of a variety of interesting social movements over which, when business admitted it, he has presided.

MR. J. ARMSTRONG.
Late Locomotive, Carriage and Wagon Divisional Superintendent: Great Western Railway.

After 46 years' service, Mr. W. C. Simpson, Chief of the General Canvassing and Theatrical Department, Great Western Railway, has retired at the age of 60 years. His railway career was commenced in the Rolling Stock Department in 1870. Six years later he was transferred to the General Manager's Office, where he passed through several departments, including for some years the charge of the Board of Trade section. His work, however, was better known during the following 18 years, when he had charge of the Advertising section. During this period many innovations were introduced, including photographs in carriages, map posters, illustrated pamphlets, Great Western Railway exhibits at exhibitions (*e.g.*, Chicago, Brussels, Antwerp, Paris, etc.), pamphlets printed in French, Italian, Spanish, etc. For the past 12 years Mr. Simpson had charge of general passenger train traffic canvassing, under the Superintendent of the Line, and had become particularly well-known in the theatrical and music-hall profession, whose travelling requirements on the Great Western Railway were his especial care.

A similar record of service is to the credit of Mr. William Lilly, Goods Agent, Great Western Railway, at Exeter. He entered the service at Bristol in April, 1870, 30 years later was appointed chief clerk, and he succeeded to the agency at Exeter in July, 1907.

[We are indebted to the *Great Western Railway Magazine* for the foregoing particulars and the portraits reproduced.]

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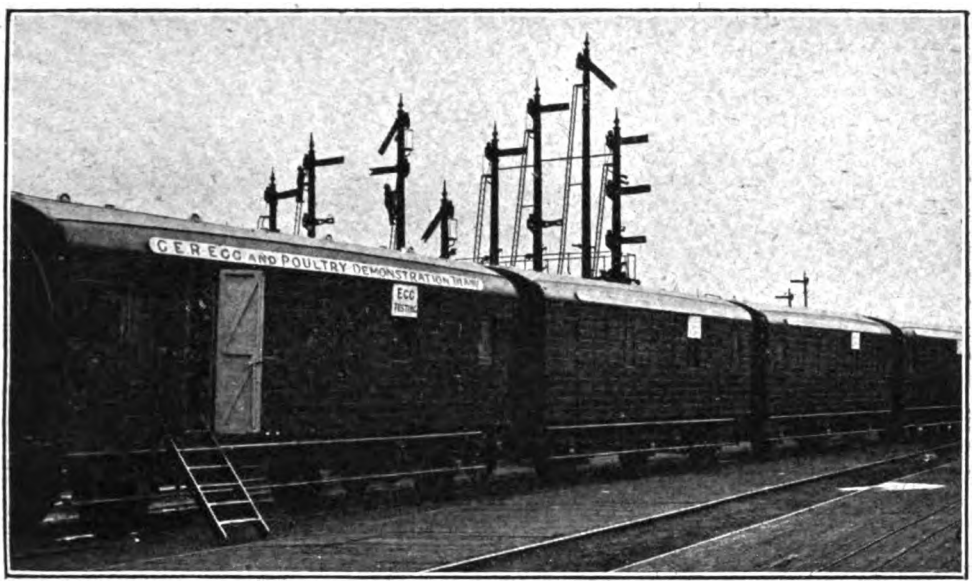


GENERAL VIEW OF DEMONSTRATION CARS.

# Egg and Poultry Demonstration Train:

## GREAT EASTERN RAILWAY.

THE Great Eastern Railway has for some time had under consideration the important question of the development of the egg and poultry industry in the Eastern Counties and, in connection with this, an Egg and Poultry Demonstration Train was operated throughout Norfolk and Suffolk, commencing October 9th. Before starting on its tour the train was on view at Liverpool Street station, when we had the pleasure of inspecting it.

The programme arranged for the tour includes demonstrations at Mildenhall, Newmarket, Bury St. Edmund's, Stowmarket, Diss, Colchester, Stoke Ferry, King's Lynn, Watton, Fakenham, Dereham, Norwich, Aylsham, Wymondham, Harleston, Woodbridge, Haverhill, Framlingham, Thetford, Ipswich, Halesworth and Sudbury, commencing October 9th and concluding November 2nd, the stay at each place being usually for a day. As far as practicable the time of the weekly market has been selected.

The train consists of four demonstration vehicles utilised for:—(1) Models of Poultry Houses and other appliances. (2) Methods of hatching and rearing. (3) Egg production, table poultry and packages. (4) Egg testing and grading. A combination restaurant car run with the demonstration cars serves as a travelling office, and for the accommodation of the staff.

The first car contains a large number of models of poultry houses suitable for all classes of poultry keepers. These embody houses upon wheels for use upon farms, scratching sheds, where greater numbers of broods have to be kept on a limited space, and also for suburban residents and cottagers, etc. Coloured plates representing the leading utility breeds of poultry are also exhibited. The second car has appliances for both natural and artificial operations. Here are hatching-boxes, incubators, brooders, coops, testing lamps, and also foods which are recommended. There is a fine series of photographs in this car of chickens in the process of development. The third car has an "egg barometer," showing the shrinkage in the size of eggs to illustrate which command the best prices upon the market. In addition, there are boxes of eggs representing various qualities, English and foreign, again with the idea of teaching which producers ought to supply. In the fourth car are shown by light the different qualities of eggs so far as the contents are concerned, as in the best trade all eggs have to be tested before they are sold. A section of a revolving test table is in use by which 60 eggs can be tested at one time. The cars generally contain a large number of photographs, and also diagrams explanatory of the methods of poultry keeping, and also in respect to the different quality of eggs.

The train is controlled by officials of the railway company, the demonstrations, lectures and so forth being under the superintendence of Mr. Edward Brown, F.L.S., who originated and organised the first two demonstration trains in this country. Mr. Brown is assisted by a



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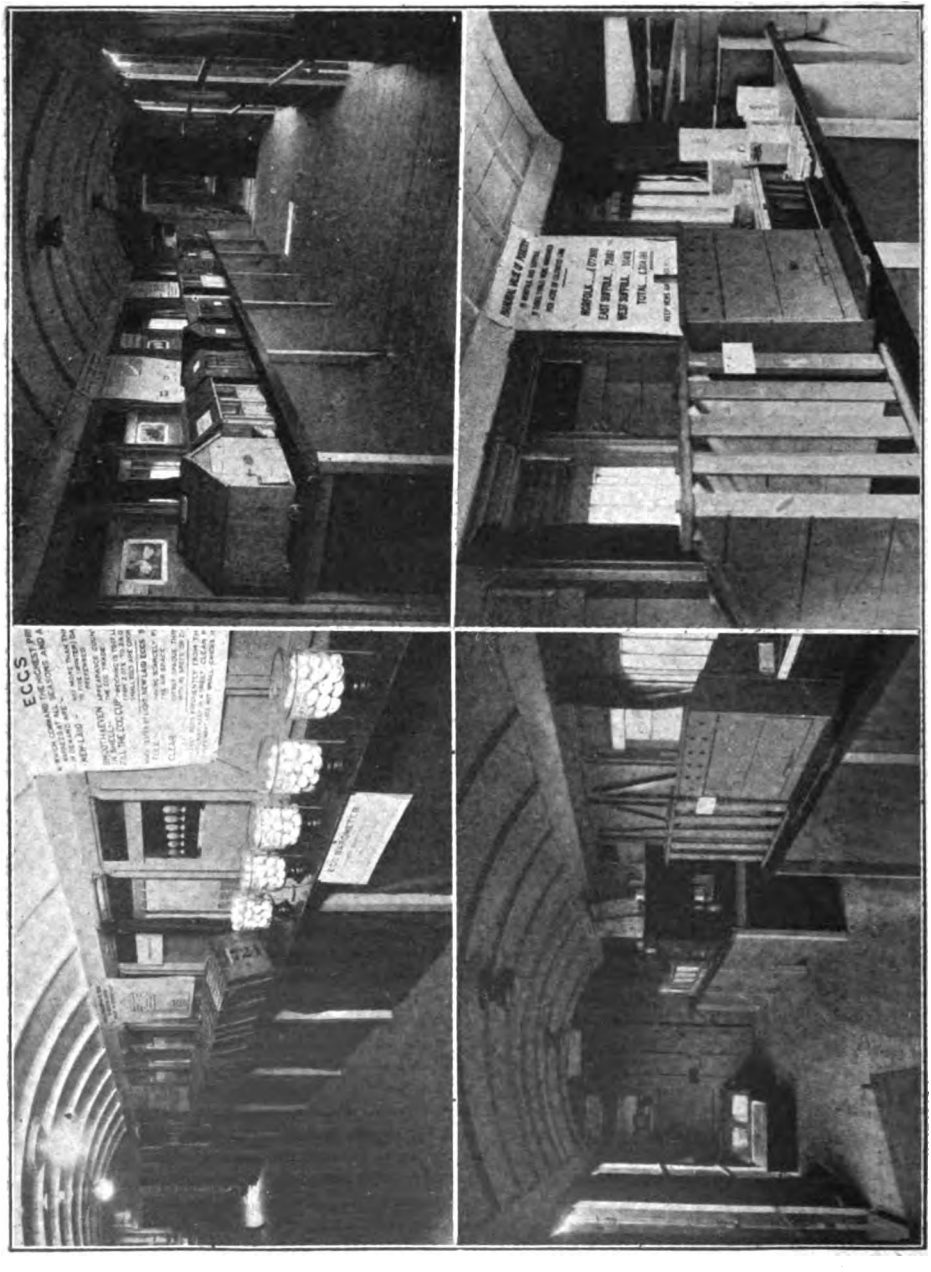


MODELS OF POULTRY HOUSES.
HATCHING AND REARING.

EGG BOXES AND "EGG BAROMETER."
HATCHING AND REARING.

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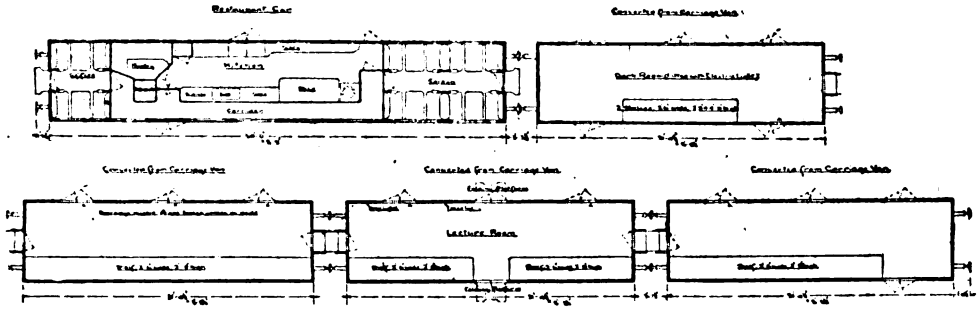
qualified staff. The vans were open for demonstrations free of charge at times locally announced, conferences or meetings being also held at each centre, one in the afternoon for convenience of visitors from the surrounding districts, and the other in the evening for local residents. Arrangements were also made for the attendance of children from elementary schools.

The campaign, of which the running of this train is one result, follows upon an exhaustive enquiry conducted for the Great Eastern Railway by Mr. Brown, one object being, by affording encouragement to producers and others, to stimulate food production, and thus help to meet the nation's requirements. Although, for various reasons, a commencement has been made with eggs and poultry, there are other phases of farming which it is hoped to deal with in due course.

A railway is the medium by which producer and consumer are linked. Great responsibilities and interests are involved. Its prosperity is dependent in large measure upon that of the districts traversed by its system; hence the policy approved, therefore, is to deal thoroughly with each section in turn. That chosen for primary treatment may be described as the Diss area. On the south it stretches from Hollesley Bay, *viâ* Woodbridge and Stowmarket, to Bury St. Edmund's; the western boundary is from the last-named capital town of West Suffolk, *viâ* Thetford to Watton; on the north it stretches from Watton, *viâ* Hingham, Wymondham and Loddon, to the North Sea. Within it is the greater part of the fertile Waveney Valley.

The latest figures available record that the agricultural divisions in which Norfolk and Suffolk are included had the following poultry per 1,000 acres of cultivated land: Norfolk, 512·2 fowls, 26 ducks, 4·3 geese, and 6·4 turkeys; Suffolk, 516·7 fowls, 25·5 ducks, 4·4 geese, and 8·2 turkeys. Similarly it may be estimated that in Norfolk there were 591 fowls, and in Suffolk 604 fowls per 1,000 acres of cultivated land. The view held is that there is capacity for practically five times that number of one species or another—which species does not matter.

Norfolk and Suffolk produce yearly about 75



PLAN OF EGG AND POULTRY DEMONSTRATION TRAIN.

definite action taken by the Great Eastern Railway in the way indicated. From the outset the Company's aim has been to band together for accomplishment of the purpose in view all who are interested in East Anglian development. Various conferences held on the initiative of the Great Eastern Railway have been attended by representatives of the Board of Agriculture and Fisheries, the Board of Trade, the Norfolk and Suffolk War Agricultural and Education Committees, the Agricultural Organisation Society, and various co-operative societies and trading interests operating in Norfolk and Suffolk. Already progress has resulted from the Company's action in respect to arrangements for collecting and marketing produce. By combination of effort on the part of all concerned in the agricultural and general interests of East Anglia, what the Company is out for should be realisable within a reasonable period of time.

To effect development over an area of nearly 6,000 square miles is a task of considerable magnitude. Fortunately the conformation and position of East Anglia are favourable. At the same time less is likely to be accomplished by distributive than by concentrated effort. The millions of eggs. They could send forth nearly 400 millions every year, in addition to a vastly increased number of chickens, ducks, geese and turkeys. The latent possibilities, therefore, are in cash value upwards of one and three-quarter million pounds sterling.

Before the war Greater London consumed upwards of 800 million of eggs and about seven million fowls or their equivalent every year. It is evident, therefore, that the Metropolitan area alone absorbs twice the possible production of Norfolk and Suffolk, and that markets are assured.

Following the demonstration train, local conferences will be arranged throughout the entire area. It is also hoped to send a motor demonstration van to villages distant from, but served by, the railway. An important part of this work will consist in making expert advice and guidance available to all classes of the community who are desirous of extending their operations. It will also include visits to individual farms.

One part of the scheme is that, as opportunity offers, demonstration centres shall be established as models for the benefit of those who may desire to take up poultry and egg production on more



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extensive lines. The Great Eastern Railway has already announced important concessions in respect to farm produce rates, and will endeavour to expedite in every way the conveyance of goods to consuming centres. Experimental trials of motor vans for gathering supplies in rural districts are contemplated. This is to ensure more rapid delivery of produce, the value of which is largely determined by its freshness. It is also proposed, where land is available at stations, to allocate sites at a peppercorn rental for the erection of buildings to be used as packing houses for eggs and poultry, for the preservation of eggs, and for the cooling of milk, so as to minimise local expense in cartage and handling, and facilitate rapid dispatch.

Whilst the Diss area is receiving consideration first, the various districts outside its boundaries will, as already stated, also be kept in view. The experience thus gained should be very valuable with classes of produce other than eggs, poultry and milk.

# Railway Literature.

RAILWAY CHARGES AND THE PRICES OF PROVISIONS. The heavy rise in the prices of provisions has directed attention to the various causes which have tended to bring about this serious result of the war. As there has been no increase in railway rates since the war began a 4 per cent. rise, specially sanctioned by Parliament to meet the cost of improved labour conditions granted by the companies in 1911 and 1912, came into force in July, 1913—the railways can hardly be made responsible for any of the advance in prices. In a pamphlet issued at 3d. by *The Railway News*, examples are given to show how small a part railway rates form in the prices of provisions even at normal quotations. The following examples may be cited:

*Milk.*—For hauling a loaded churn 90 miles and the return of the empty 90 miles, the railways receive 1·04d. per gallon, or ¼d. per quart.

*Fish.*—The railway rate to London from Grimsby works out at ¼d. per lb. for high-class fish, and 0·16d. per lb. for commoner fish at owner's risk. From Aberdeen the figures are 0·62d. and 0·40d., and from Penzance 0·42d. and 0·32d. per lb. respectively.

*Meat.*—For foreign meat the rate from Liverpool to London works out at 0·14d., and for British meat from Aberdeen to London at 0·38d. per lb.

*Potatoes.*—From Lincolnshire to London the average rate is about 9s. per ton (2,240 lb.), representing about 9 per cent. if the selling price is £5 per ton; about 4½ per cent., if £10; and about 3 per cent., at £15 per ton.

*Fruit from Kent.*—For fruit conveyed by passenger train, the rate at company's risk over an average distance of 50 miles is less than one-fifth of a penny per lb., and at the owner's risk one-sixth of a penny per lb.

*Strawberries from Hampshire.*—This fruit is carried by special trains to London (77 miles) at a sixth of a penny, to Manchester (230 miles) at a halfpenny, and Inverness (600 miles) at three farthings per lb.

*Farm and Dairy Produce.*—The Great Eastern Railway carries farm and market garden produce from the grower direct to consumers by passenger train from all the Company's stations to London and stations in Great Eastern suburban district, and from all Great Eastern stations (except those within 20 miles of London) to the principal resorts served by the Great Eastern, at a charge of 4d. for 20 lb. This is for special fast deliveries by passenger train; particulars are also given of the ordinary rates for farmers and others, and these are much lower.

THE TECHNICAL PUBLISHING CO., LTD., send a copy of the second edition of "The Fan," by Chas. H. Innes, revised by W. M. Wallace and F. Raby Jolley. Price 8s. 6d. net; post free 9s. net; abroad 9s. 6d. net. This work deals with the theoretical and practical aspects of centrifugal and other fans, propellers and other applications of similar methods of working.

THE THEORY AND PRACTICE OF MODERN FRAMED STRUCTURES. By the late J. B. Johnson, C.E., C. W. Bryan, C.E., and F. E. Turneaure, C.E. [Chapman & Hall, Ltd. Price 17s. net.] This volume is Part III. of a work which has attained high appreciation in the United States, and now appears in a ninth edition described as "rewritten" by the third author specified in conjunction with Mr. W. S. Kinne. The original work—in three parts: I., "Simple Structures"; II., "Statically Indeterminate Structures and Secondary Stresses"; and III., "Design"—was first published in 1893. Owing to the increased development and specialisation of many lines of structural engineering it has been thought best in preparing the present edition to omit certain topics treated in the earlier work. These relate especially to building construction, elevated tanks, swing bridges, and trestles. The present volume includes, first, a discussion of certain topics of fundamental importance in bridge design, and, second, the detailed analysis and design of a few of the more common structures likely to be of immediate interest to the student and the young engineer. Appendix A contains the general specifications for steel railroad bridges of the American Engineering Railway Association prepared by its Committee on Iron and Steel Structures; Appendix B, a few tables of the most frequently used standards; and Appendix C, a treatment of the mechanics of unsymmetrical bending.

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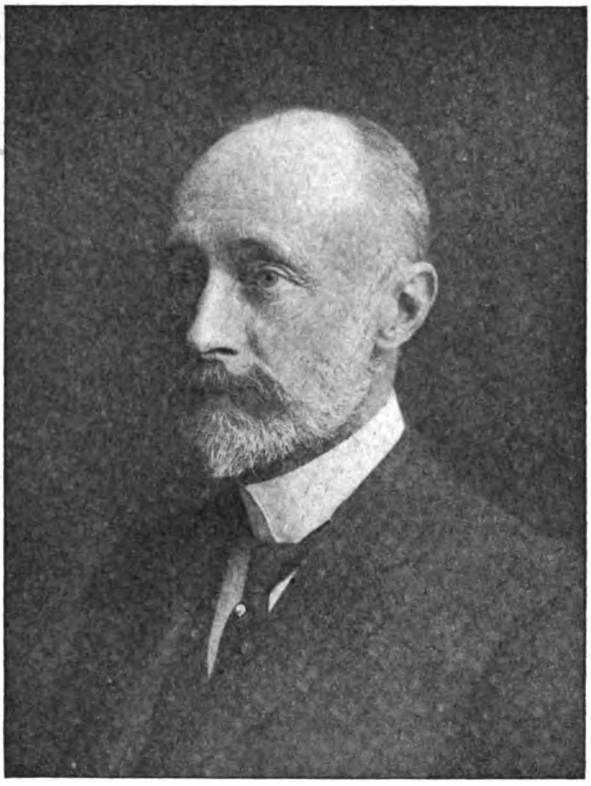
# The Continental Department of the London, Brighton and South Coast Railway.

## Appointment of Mr. W. J. Williams as Continental Traffic Agent.



MR. W. J. WILLIAMS.

WE have pleasure in reproducing above a portrait of Mr. W. J. Williams, who has been appointed Continental Traffic Agent of the London, Brighton and South Coast Railway, following the retirement, under the age limit, of Mr. T. N. Wylie, who has occupied the position of Continental Traffic Manager for several years past. Mr. Williams received his education at the Brighton Grammar School and the Whitgift Grammar School, Croydon, and entered the service of the Brighton Railway in 1876 when 16 years of age. He has held the position of Chief Clerk in the Continental Department since 1905. He is a son of the late Mr. W. J. Williams, who retired from the position of Traffic Superintendent of the same railway in 1884, after upwards of 42 years' service, having joined the staff of what was then the "London and Brighton Railway" in 1842.

Mr. T. N. Wylie has been interested during a long period of years in Anglo-Continental traffic, finding his duties on the Continent considerably aided by his intimate knowledge of French and German. He commenced his railway career with the London, Chatham and Dover Company, and was for some years Agent at Queenboro' for the Zeeland Service, being transferred thence to Holborn as Parcels Manager of the Chatham Company. It was towards the end of 1898 that Mr. Wylie was selected by the late Mr. J. F. S. Gooday, then General Manager of the Brighton Railway, to succeed Mr. Gerard as their Continental Traffic Manager, and he assumed control on January 2nd, 1898.

Mr. Wylie's period of office has witnessed many improvements in the Newhaven-Dieppe Service in all directions, and up to the outbreak of war the route was making continued advances in public favour. Although the Brighton Company was not actually the first to put a turbine steamer on the cross-channel service, it is well-known that Mr. Wylie was the earliest advocate of the turbine engine for Channel traffic, having quickly appreciated its possibilities for cross-Channel boats, but even in those early days he could scarcely have realised to what successes the turbine was destined. He was, however, highly gratified when the Directors of the Brighton Company, with the approval of the Western Railway of France, who jointly control the Dieppe Service, placed the turbine steamer *Brighton* on the service in 1903.



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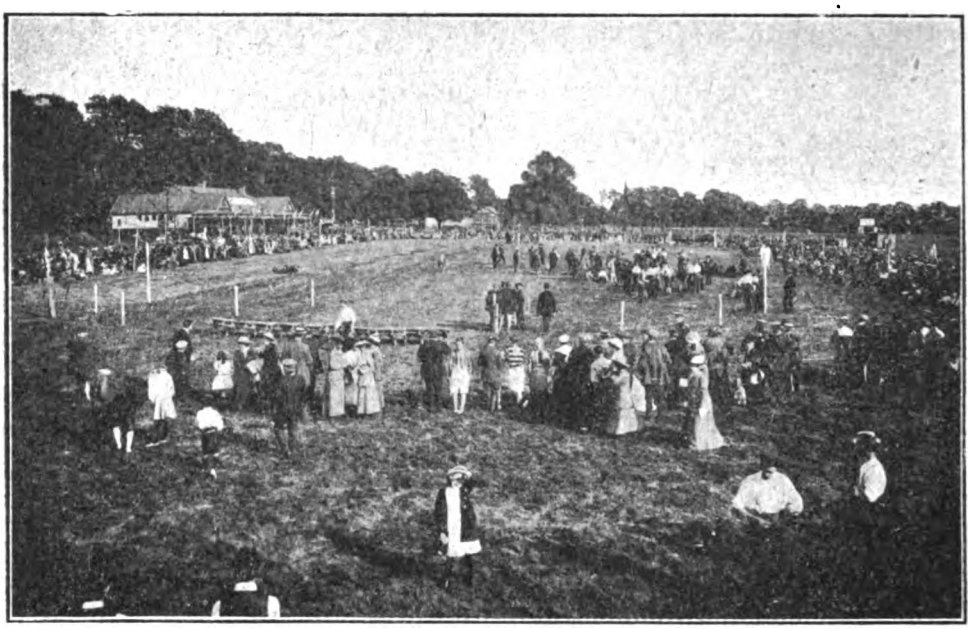
# METROPOLITAN RAILWAY WAR SERVICE CORPS SPORTS.



A VIEW ON THE GROUND.

ON a recent Saturday a great gathering assembled at Wembley Park Athletic Ground for the sports organised by the Metropolitan Railway War Service Corps with the object of enlisting recruits for the Corps, for raising money to enable the Women's Section to make and send woollen garments and comforts to our men at the Front, and for entertaining wounded soldiers. Some 3,000 visitors and competitors enjoyed perfect weather and the entertainment. The competitors for the prizes were many and zealous, and every item passed off to time and without a single hitch. No one enjoyed the function more than the 60 to 70 wounded soldiers from various hospitals under the care of nurses, and they shared with great zest in some of the events of the day.

A special series of competitions, for the wounded guests were arranged and superintended by Mr. John Wardle, Commercial Manager, Metropolitan Railway, while Mr. W. Challis (Automatic Signals) was responsible for the ordinary events. Mr. R. H. Selbie (General Manager) was President and Referee, and at the close of the competitions made a brief and very happy speech. He said that although this was the first time they had had a gathering of that kind, he hoped that it was not to be the last. He also hoped that they might look forward to as large, if not larger, gathering some time next year, to celebrate a victorious peace. He knew that that wish was in the hearts of everyone present. They were all longing for the War to cease, and the Metropolitan War Service Corps, consisting of those who could not go to the Front, were doing their share of work at home, and helping to bring the end nearer.

He was proud that their own railway was the pioneer in the movement, but then the "Met." was always in the forefront. The Committee of the Sports had said that there were to be no speeches or votes of thanks, and he had broken the rule for just two minutes. He thanked all who had made the day such a brilliant success and asked to be excused for mentioning just one name, that of Mr. W. Challis. He also thanked the Metropolitan and Great Central Silver Prize Band for their services that day.

Mrs. Selbie then presented the prizes to the successful competitors. The list is too long for reproduction here, but covered vegetable growing, a series of races for male and female competitors in various classes, shooting, and a series for the benefit of the soldiers present. Three cheers were given for Mrs. Selbie, who was presented on behalf of the Sports Committee, with a splendid bouquet of pink carnations by Miss I. McIlroy. Mrs. Selbie replied and expressed the pleasure it had been to her to come, and her fervent hope to do so again next year. Mr. W. Challis was given a "biscuit" for all he had done, and in response spoke of all concerned who had made his work easy. Flowers, sent by friends, were then given by Mrs. Selbie to all the wounded and a great box sent on to the hospitals.

The evening closed with a concert in the Pavilion Grounds, by the Hospital Entertaining Party, which now has 34 members. During July and August concerts were given to wounded soldiers at Pinner (twice), Harlesden, Rickmansworth, Harrow, Brondesbury, Uxbridge, Dollis Hill, and Northwood. Every success has attended the work and requests have been made for repeat visits.



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# PERTINENT PARAGRAPHS

**The Railway Settlement.**

For purposes of record the terms upon which the recent negotiations between the Committee of General Managers of railways and representatives of the National Union of Railwaymen and the Associated Society of Locomotive Engineers and Firemen in regard to the claim for wage increases in view of the increased cost of living, may be set forth.

Meetings were held for the purpose of considering applications made by the Trade Unions on behalf of the railwaymen for an increase of the war bonus of 5s., granted by the railway companies in October, 1915. The general managers reminded the Trade Union delegates that in October, 1915, they agreed with the companies that the settlement then made should remain in force until after the Government had given notice to determine the present agreement as to the control of railways, and that the two trade unions definitely undertook not to present or support any fresh demands upon the companies for increased bonus or wages during the pendency of the settlement.

The Trade Union representatives explained that they recognised the binding nature of the agreement of October, 1915, but contended that the prolongation of the war and the continuous rise in the cost of living have compelled them to ask the companies for a reconsideration of the position.

Having regard to all the circumstances, the railways expressed their willingness to review the situation, and after discussion the following agreement was arrived at :—

(1) The War Bonus paid by the railways under the agreement of October, 1915, to be increased as shown below :—

Employés eighteen years of age or upwards.—Present war bonus, 5s. ; revised war bonus, 10s.

Employés under eighteen years of age, except boys engaged since January 1st, 1915, at rates of pay which exceed by 5s. or more the rates usually paid to boys occupying positions similar to those in which such newly-engaged boys are working.—Present war bonus, 2s. 6d. ; revised war bonus, 5s.

(2) The first payment of the revised war bonus to be in respect of the week ended September 16th, 1916.

(3) The truce entered into at the meeting between the parties hereto on October 1st, 1914, to continue in force.

This was signed as follows : For the Railways—W. Guy Granet (Chairman), Wm. Clower (Secretary).

For the National Union of Railwaymen.—A. Bellamy (President), J. H. Thomas (Assistant Secretary).

For the Associated Society of Locomotive Engineers and Firemen.—John Hunter (President), J. Bromley (Secretary).

We understand that the advanced war bonus will not only benefit the wages of men and boys, who have hitherto been receiving 5s. and 2s. 6d. per week respectively, and who will now receive 10s. and 5s. per week respectively, but also the members of the clerical staff whose salary does not exceed £200 per annum. It will thus mean a total addition to juniors of £13 and to seniors £26 per year, while clerks in receipt of upwards of £200 and not exceeding £226, will receive a proportionate addition, bringing their income up to the last-named figure. Subsequently it was further agreed that all men employed in the railway workshops shall receive a war bonus of 5s. a week, and all boys (under eighteen) similarly employed 2s. 6d. a week.

**War-Time Railway Traffic.**

Letters continue to come to hand referring to unusual features of traffic working due to the conditions which now apply, but here and there a reference occurs to a matter which is not strictly a curiosity. In this category must be placed the appearance of a Hull and Barnsley engine at Rye, South Eastern and Chatham Railway. As a correspondent remarks, this is "a long distance from the home railway," but in this instance is explained by the fact that for a considerable period a number of Hull and Barnsley locomotives have been lent to the South Eastern and Chatham Railway, so that they rank as belonging to that system for the time being.

Mr. W. L. Kenning writes that South Eastern and Chatham Railway engine No. 267 usually works the 10.50 a.m. goods train from Red Hill Junction to Willesden Junction and back ; London and North Western Railway 0-6-0 engine No. 53 similarly works the 12 noon goods from Willesden Junction to Red Hill and back ; Great Eastern Railway 0-6-0 goods engine No. 823 works to Southall, Great Western Railway ; South Eastern and Chatham Railway No. 317 works over the Great Western Railway from Reading to Oxford Road (London and North Western Railway), and back from Oxford to Reading. He has also noted South Eastern and Chatham Railway engines working through from Dover to Oxford on ambulance trains, while a Great Western Railway engine recently



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worked a special goods train through from Oxford to Cambridge. He also mentions a Great Northern Railway engine observed shunting at sidings between Tulse Hill and Streatham Hill, London, Brighton and South Coast Railway; that Great Eastern Railway and London and North Western Railway engines have worked to Tadworth, South Eastern and Chatham Railway on troop trains, while Great Central Railway and London and North Western Railway engines have run through to Reading, etc., *viâ* Banbury or Oxford respectively. Regular duties taken by London and South Western Railway and Great Western Railway goods engines, from Southampton to Leamington and from Leamington to Eastleigh, the two engines taking the opposite workings each day, are also specified.

### Further Examples of Special Working.

Mr. J. Lomas, of Hale, Cheshire, mentions that London and North Western Railway goods trains now work regularly between Birkenhead and Leeds over the Cheshire Lines (Chester and Altrincham section). These trains before the war used to travel *viâ* Warrington and Stockport, traversing the Glazebrook and Stockport line (Cheshire Lines Committee) from Skelton Junction but leaving the latter line at Northenden, and then running *viâ* Stockport and Ashton to Leeds. It is interesting to note that these trains traverse four different joint lines, viz., Great Western and London and North Western (Birkenhead–Helsby), Cheshire Lines Committee (Helsby–Altrincham), Manchester South Junction and Altrincham Railway (Altrincham–Deansgate Crossing), Cheshire Lines Committee again from Deansgate Crossing–Northenden. Here the trains reach London and North Western metals and travel *viâ* Edgeley to Ashton (Lancashire and Yorkshire and London and North Western) to the Manchester–Leeds line (London and North Western). He also mentions that engines of the 2000 0–6–4 tank class are now utilised to haul Midland Railway goods between Northwich and Stockport or Buxton over the Cheshire lines. "Double-ender motor trains" (driving compartments each end of train) are now used on the Wilmslow–London Road section, London and North Western Railway. With reference to Mr. Ahron's remarks anent the London and North Western and Great Western services between Manchester and Chester, Mr. Lomas states that one Llandudno express (afternoon) is still hauled by a Great Western engine, usually a 2–4–0.

### Locomotive Coincidences.

In the August number reference was made to locomotives of consecutive numbers working in combination. Mr. W. L. Kenning mentions that some time ago (when bound for the Great Northern Railway), near London Bridge, South Eastern and Chatham Railway, he passed a Great Northern Railway goods train (going north) hauled by two 0–6–2 tanks Nos. 1576 and 1577, and as he was waiting at King's Cross this same goods train came up from the underground into the suburban station. More recently he saw a South Eastern and Chatham Railway empty train running through Purley hauled by two engines, No. 158 (0–4–4 tank, running bunker first, leading), and No. 159 (4–4–0). On the London, Brighton and South Coast Railway he noted another form of coincidence, namely, a goods train with the engine and brake van of the same number! The engine was No. 341, a new 2–6–0 engine, painted lead colour. The brake van was also No. 341, a 20-ton 6-wheeled van, marked "12/9/16." Some time ago he noted a Midland goods train at London Bridge, hauled by old 0–4–4 tanks No. 1219 and 1220. Recently at Paddington he saw three Great Western Railway "County" tanks standing side by side; they were Nos. 2232, 2223, and 2222.

In this connection we may mention that in the days of the Great Northern 8 ft. single class we once observed a train worked by No. 7 and No. 777, both of the famous Stirling class, while the preceding train had been taken by No. 21, one of the 7 ft. single type. Quite recently we noted three tank engines, all No. 1, within a few hours. The first was on the Great Eastern Railway (2–4–2 tank), as we were travelling to Liverpool Street *en route* for the London and South Western Railway. And on the latter line, within a few minutes of one another, No. 1 London and South Western Railway (0–4–4 Adams' tank) and No. 1 London, Brighton and South Coast Railway (4–4–2 5 ft. 6 in. tank) were noted near Clapham Junction.

Mr. J. T. Young, of Newcastle-on-Tyne mentions that only a few weeks ago he noticed one of the Anglo-Scottish expresses leave Waverley station, Edinburgh, taken by North Eastern locomotives Nos. 1234 and 1235, both of the R1 class. He also refers to North British 2–4–0 engines Nos. 1248 and 1246 working on the Berwick-St. Boswell's line, and he saw both of them in St. Boswell's station at the same time, together with No. 1256, of the same class, but rebuilt in 1914.

Mr. Young also refers to Highland Railway engine No. 145 *Murthley Castle*, observed at Newcastle, after repair at Gateshead, and painted a light green with the letters "H.R." on the tender, instead of the usual "Highland Railway."

### Flashlight Signals on the Furness Railway.

In view of results so far realised with "AGA" flashlight signals on the Furness Railway further installations have recently been added. We understand that experience with these has been very satisfactory, and the use of them is being gradually extended where it is thought they would be an additional safeguard. In addition to the places where the lamps were originally installed—Down and Up distant signals at Park South, Askam station and Green Road—they are employed at each end of Kent Viaduct during its reconstruction and they have been

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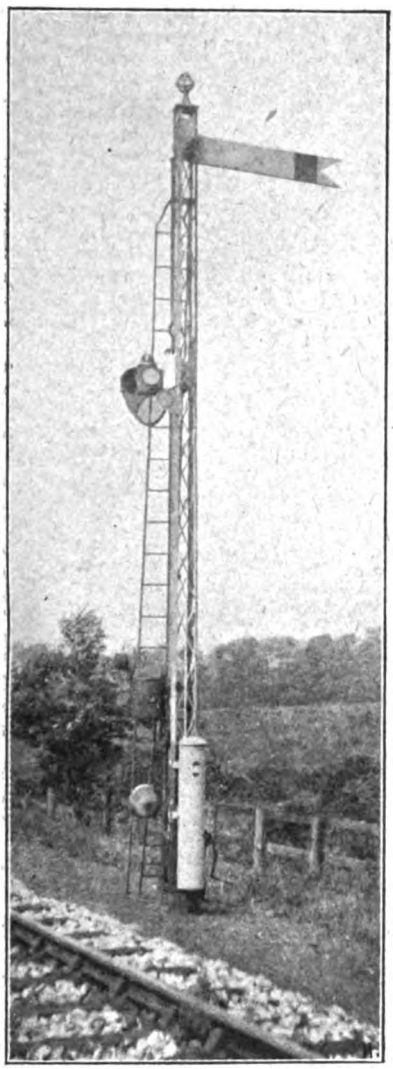
installed at Limestone Hall Level Crossing. Since the use of these lights at level crossings no gates have been run through at the places



DISTANT SIGNAL FITTED WITH "AGA" FLASHLIGHT: FURNESS RAILWAY.

where they are fixed. We are indebted to Mr. Alfred Aslett, Secretary and General Manager, for the photograph showing a distant signal so fitted.

### Old Great Western Railway Locomotives: The *Pembroke*.

MR. NORMAN H. BAYLEY, a reader of many years standing, now serving, like so many others, with His Majesty's Forces in France, writes in reference to an old Great Western Railway locomotive which he remembers working on the Didcot, Newbury and Southampton Railway about the year 1900. The name of the engine was *Pembroke*, and it had a large safety valve casing over the firebox and a tall funnel. Some other particulars are mentioned in an uncertain way. Mr. Ahrons has kindly furnished the desired information as follows: "This engine was a 2-4-0 of Sharp Stewart's standard type of which many were used on the Furness and Cambrian Railways. It had belonged to the Pembroke and Tenby Railway, and was one of half-a-dozen miscellaneous engines taken over when the Great Western Railway acquired that line. It was a 2-4-0 and was built by Sharp Stewart and Co. in 1868 (I believe), and had 5 ft. 6 in. coupled wheels and 16 in. by 20 in. cylinders. The Great Western Railway numbered it 1361 and for a little time it was, as Mr. Bayley says, used on the Didcot and Newbury line."

### Some Locomotive Types of the Empire.

REFERRING to Mr. J. F. Gairns' article in last June number under this title, Mr. Malcolm Niven remarks:—"One very marked detail in all the modern engines shown is the popularity of the Walschaert valve gear. Having written about the 2-4-0 engines on the Glasgow and South Western Railway I cannot pass without remarking upon the general likeness thereto of the Midland 2-4-0 Johnson engines. With the exception of dome, cab, safety valves and outside axle boxes to leading wheels, these engines are much the same in size and general contour to Mr. Smellies' 2-4-0 engines of 1880. I presume this 2-4-0 will belong to the same period and is contemporaneous with the Glasgow and South Western 2-4-0 engines mentioned. I would also direct attention to the great similarity in Mr. Drummond's No. 720, on page 392, to those on the Caledonian Railway built about 1890 or so. Mr. Drummond's No. 89 and 90 are, in outward appearance, very like the London and South Western engines."

### New Engines on the Caledonian Railway.

MR. C. E. S. LITTLEJOHN writes from Coatbridge, pointing out, in regard to the paragraph on page 293 of the October RAILWAY MAGAZINE, that the whole sixteen of Mr. Pickersgill's new 4-4-0 engines, both those built at St. Rollox and those built at the Atlas Works, have 6-wheeled tenders. He noted No. 124 with a double bogie tender which belonged to one of the "140" class, and suggests that the statement that some of these engines are thus fitted, has arisen because of this. The numbers of the St. Rollox engines are 113-116, 121 and 124. No. 121 replaces the 1912 locomotive of that number, which was destroyed at Gretna on May 22nd of last year. The new Atlas Works 4-4-0's are numbered 928-937. The Drummond bogies, Nos. 113-116 and 124, have been renumbered 1113-1116 and 1124.

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# WHAT THE RAILWAYS ARE DOING

A COMMITTEE has been appointed by the Home Secretary to inquire into the social and economic results of the Summer-Time Act, 1916, and to consider (1) whether it is advisable that summer-time should be reintroduced in 1917, and in subsequent years, and, if so (2), whether any modifications in the arrangements are required, and (3) between what dates summer-time should be made operative. The change back to normal time was effected in the early hours of Sunday, October 1st, without causing any inconvenience. Certain special arrangements had to be made to cover the movements of trains overlapping the transition time, but everything worked quite smoothly. In Ireland there were also numerous alterations in the time-tables due to the alteration of time to agree with England and Scotland, many of these being required by the fact that the mail trains running in connection with steamer services to and from England required important alterations by way of correction.

* * *

ON Thursday night, September 21st, German naval forces in the North Sea captured the Great Eastern Railway steamer *Colchester*, taking it into Zeebrugge. It was only three months previously that the *Brussels*, belonging to the same Company and engaged on similar service, was intercepted by German destroyers and escorted, as in the case of the *Colchester*, into Zeebrugge. This was followed by the murder of Capt. Fryatt. The *Colchester* is a smaller vessel than the *Brussels*, employed in normal times more particularly for cargo service from and to Harwich across the North Sea. Originally she was one of the standard vessels for the Harwich-Continental services, but since larger boats have been introduced, has been adapted for cargo. She is a twin-screw boat, 291 ft. long, 32 ft. beam, 963 gross tonnage, and 1,803 indicated horse-power.

* * *

MR. WILLIAM MELVILLE, who has occupied the position of Chief Engineer, Glasgow and South Western Railway, for the last twenty-five years, has retired. Mr. Thomas Keeling, chief assistant for many years, has been appointed to succeed him. Mr. Melville started as an apprentice on the North British Railway in Edinburgh under the late Mr. James Bell, who was then engineer-in-chief of that railway. After five and a half years' service there he was transferred to Glasgow as chief assistant to the late Mr. James Carswell, the district engineer, who afterwards became chief engineer of the railway in succession to Mr. Bell. While in the service of the North British Railway in Glasgow, Mr. Melville carried out the pier works at Craigendoran, near Helensburgh, and also large timber wharfage works and breakwater at Port Edgar on the Forth, near Queensferry. After having served on the North British Railway between thirteen and fourteen years, he was appointed as chief assistant to the late Mr. George Graham, engineer-in-chief of the Caledonian Railway, where he carried out a number of important railways, including the railway from Greenock to Gourock, and the construction of the Gourock Pier, where a large passenger traffic in connection with the railway is carried to the coast and the Irish ports. After having been in the service of the Caledonian Railway for about nine years, he was appointed engineer-in-chief of the Glasgow and South Western Railway, in 1891, and since that time has carried out all the new works of this Company. Besides being engineer for the Glasgow and South Western Railway, Mr. Melville acted as engineer for the Glasgow, Barrhead and Kilmarnock Joint Line, and also as engineer for the Portpatrick and Wigtownshire Joint Railways alternately with the engineer of the Caledonian Railway. He is a Member of the Institution of Civil Engineers and of the Institute of Engineers and Shipbuilding in Scotland, and has acted for a term as Vice-President of the latter Institution.

* * *

WE regret to record the death of Mr. William Thomson, M.V.O., who retired on July 1st, 1911, from the position of Superintendent of the Line, South Eastern and Chatham Railway, which he had held since 1899. Mr. Thomson entered the service of the London, Chatham and Dover Railway in 1863 as a junior clerk at Victoria. In 1878 he became Station Superintendent at Holborn Viaduct. At the end of 1881 he was transferred to the office of the Superintendent of the Line at Victoria, being appointed Chief Clerk and Outdoor Assistant to the late Mr. William Cockburn, and at the death of that gentleman in December, 1891, was appointed Outdoor Superintendent. In 1898, when the working union of the Chatham and South Eastern companies was arranged, Mr. Thomson was appointed Joint Superintendent with Mr. Buckmaster, the then Superintendent of the South Eastern Railway, and at the death of the latter in August, 1899, became Superintendent of the Line of the joint undertaking under its new title of the South Eastern and



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Chatham Railway. Mr. Thomson was formerly a Major in the Engineer and Railway Staff Corps, and was an officer of the French Order of the Dragon. He was also a member of the Rule Book Committee of the Superintendents' Conference.

* * *

THE UndergrounD Railway has issued a booklet on Hampstead, of twenty-four pages with eight pencil drawings by Fred. Richards, A.R.E. It is a unique example of modern printers' art, and bears many of the characteristics noticeable in the fine work of the early craftsmen. Instead of being given to the public the booklet is to be sold. The UndergrounD, acting in the spirit of the times, has presented 10,000 copies to the Mayor of Hampstead, to be sold at 6d. each for the benefit of the wounded soldiers. Copies may be obtained from the printers and publishers, Messrs. Sanders, Phillips and Co., Ltd., at the Baynard Press, 6 and 8, Upper Thames Street, E.C.

* * *

MR. W. N. ASHBEE, F.R.I.B.A., chief of the architectural section of the Chief Engineer's Department, Great Eastern Railway, has retired owing to ill-health. Mr. Ashbee was appointed in 1874, by the late Mr. Edward Wilson, to superintend the erection of the buildings at Liverpool Street station which was then being carried out by Messrs. Lucas Bros., and was so occupied during 1875 and part of 1876. At the same time he supervised the construction of Bishopsgate (now Liverpool Street) station on the Metropolitan Railway, and the underpinning of St. Mary Moorfields Chapel (R.C.) which has since been pulled down. In 1883 he entered the service of the Great Eastern Railway, and at once began the designs for the new station buildings at Norwich (Thorpe); this was followed by new stations at Colchester, Newmarket, Hertford, Southend, Felixstowe and Wolferton, and a large number at various other places, together with engine and goods sheds, stationmasters' houses and cottages for staff. Mr. Ashbee prepared the drawings and superintended the construction of the buildings on the Pier at Lowestoft and the electric light station at Norton Folgate. The designs and execution of the extensive buildings in connection with the enlargement of Liverpool Street station were of a very arduous nature, and occupied a considerable amount of the time of a large staff of draughtsmen during the greater part of three years. These important improvements were completed and brought into use on April 2nd, 1894.

* * *

THE Midland Railway Rifle Club, of which Sir Guy Granet is President, Mr. D. Bain captain, and Mr. J. Dalziel adjutant, continues its prosperous course. According to the annual report the interest has been well maintained throughout the year. The membership is 630, and up to the present over 550 past and existing members (Derby and out-stations) have joined the Colours. The total number of out-station clubs is fourteen, representing principal cities and towns, in all parts of the Midland Railway system.

* * *

THE DUKE OF DEVONSHIRE, late Chairman of the Furness Railway, was the honoured guest at a luncheon of the Freemasons of Derbyshire, as their Provincial Grand Master, at the Masonic Hall, Derby. He was presented with valuable tokens of esteem to mark the occasion of his appointment as Governor-General and Commander-in-Chief of the Forces in Canada. Among those present was Mr. George McLaren Brown, Past-Master of the Canada Lodge, London, and European manager of the Canadian Pacific Railway.

* * *

THE coat of arms in colours, applied by transfer, which has appeared on the tenders of Great Western Railway locomotives for the past ten or eleven years between the words "Great Western," is being discarded as the engines pass through the shops. The khaki-painted locomotives were the first to be robbed of this adornment. Now the green-painted locomotives are sharing this fate. The coats of arms on the splashers of the London and South Western locomotives have also disappeared.

* * *

THE King's Cross depôt of the Great Northern Railway was the first on that line to have women engine cleaners, and the majority of the workers are still with them. The women are middle-aged, wives or widows of soldiers. Two working uniforms are supplied. Women are also employed in the lamp-room, oil stores, and messroom.

* * *

THE Manchester Ship Canal Company announce that in accordance with the provisions of the Manchester Ship Canal Act (1904) Mr. William Charles Bacon, of Shawbrook Lodge, Burnage, Manchester, has been elected Chairman.

* * *

COLONEL ALEX BUCHANAN, J.P., whose death was recently announced, was an honoured member of the Committee of the Railway Servants' Orphanage, Derby. Representing the Railway Servants' Orphanage at the funeral were Mr. A. J. Grinling (Vice-Chairman) and Mr. A. E. Dean (Secretary).

* * *

ON Saturday, September 16th, a large party of members of the Railway Club and friends inspected the northern section of the Great Northern Railway's Enfield-Stevenage deviation line. It will be remembered that a visit was paid in the month of July to the southern half of the new line, from Cuffley to Hertford, the second trip completing the inspection of the works involved. The principal engineering works on the northern section are (starting from Hertford) a tunnel a quarter of a mile in length, a deep cutting and a large viaduct where the line crosses the River Bean. But in addition to these a great



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deal of heavy work has been necessary where the deviation joins the main line near Knebworth, including a bridge forty feet wide carrying the Great North Road over the railway, a new road necessitating two other bridges, and the burrowing junction by which connection is made with the main line. Acknowledgment is made of the courtesy of Mr. Bailey, of the Great Northern Railway, and to the Contractors' Engineers. On Tuesday, October 10th, Mr. A. W. Bartlett read an interesting paper on the North London Railway, which aroused considerable interest, and was followed by an animated discussion. At the next meeting, on Tuesday, November 14th, Mr. G. W. J. Potter will deal with "Railway Time-Table Maps—Summer, 1916."

* * *

THE Great Western Railway has painted some of its 4-6-0 two-cylinder passenger engines (2900 class), as well as some of the 4-4-0 passenger engines of various types, in the khaki livery which is now generally familiar.

* * *

WE regret to record that the Rt. Hon. Thomas Andrews, for many years Chairman of the Belfast and County Down Railway, died on Tuesday, September 26th, at Comber, County Down, in his seventy-fourth year.

* * *

IN regard to a paragraph stating that restaurant cars have been withdrawn by the North British Railway from certain trains between Edinburgh and Glasgow, we understand that the withdrawal was only a temporary measure during a busy period, and that these cars are still in use on the trains concerned.

* * *

THE Great Central Hotel at Marylebone, Great Central Railway, has been taken over by the Government for use as a convalescent home for wounded officers. There are some 500 rooms in the hotel.

* * *

SEVERAL Caledonian Railway locomotives have been repaired at Stratford Works, Great Eastern Railway, their appearance so far south having attracted considerable attention. They are of the usual 0-6-0 goods classes.

* * *

A PAMPHLET containing a list of Stock, Poultry, and Egg Auctions has been issued by the Great Eastern Railway. It gives the names of the towns, the days and time the sales are held, class of stock, etc., with the name and address of the auctioneers. A copy will be forwarded post free, upon application to the Chief Traffic Manager, Great Eastern Railway, Liverpool Street Station, London, E.C.

FROM the editor of the *Great Western Railway Magazine* we have received a leaflet in furtherance of the "Safety" movement, which has received so strong support during recent years on the Great Western Railway, together with a medallion inscribed on one side "Is it safe: charm against accidents," and on the other with the advice "In every action ask yourself 'Is It Safe?'—this will disclose unseen dangers, inspire forethought, induce care, and prevent accidents." We cordially endorse the propaganda of which this is one indication, and would pass on the advice to all our readers, in railway service or general employment.

* * *

SIR THOMAS TAIT, for many years head of the Australian railway system, and previously connected with the Canadian Pacific Railway, has been appointed Director-General of National Service in Canada.

* * *

THE collapse of the great centre span of the Quebec Bridge on Monday, September 14th, was explained officially as being due to the failure of the connection holding the suspended span, which was being gradually raised into position, letting the main span drop, and dragging away the north side connections. The bridge is being built by the St. Lawrence Bridge Company for the Dominion Government, to serve for the Grand Trunk, Canadian Northern and Intercolonial Railways. The suspended span, which collapsed, was 640 feet long and weighed about 6,000 tons. The whole central span of the bridge is 1,800 feet, being the largest single span in the world, and 90 feet more than the span of the Forth Bridge. It will be recalled that the southern section of the bridge collapsed on August 29th, 1907, when there was heavy loss of life.

* * *

A SET of lantern slides, artistically coloured, of war cartoons and pictures of the Italian fighting by well known Italian artists, has been prepared by the London office of the Italian State Railways. Apart from the merit of the artists' work they are noteworthy in that they depict in both humorous and dramatic fashion the true trend of public opinion in Italy both before and after that country entered into the conflict. The collection includes slides from actual photographs of the Italian army at work, also war views of the magnificent Alpine and Dolomite regions at and beyond the Italian frontier, the scene of severe fighting. These interesting slides are lent without charge to *bona fide* lecturers. For further particulars application should be made to Mr. W. Stormont, London Manager, 12, Waterloo Place, Regent Street, London, S.W.

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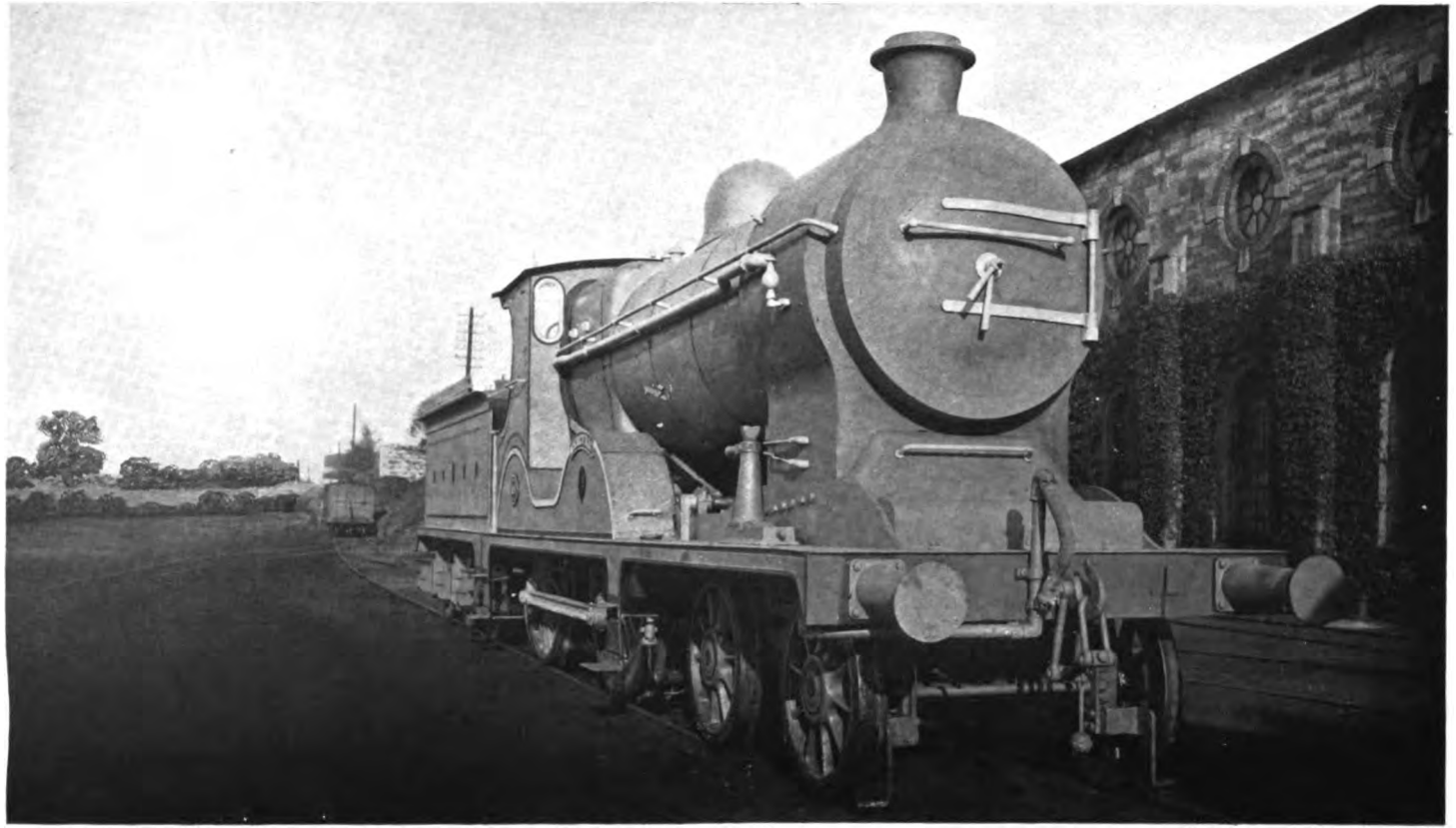

**REBUILT MAIN LINE PASSENGER LOCOMOTIVE No. 124, "MERCURIC": MIDLAND GREAT WESTERN RAILWAY OF IRELAND.**

Mr. W. H. Morton, Locomotive, Carriage and Wagon Superintendent.

Cylinders, 19 in. by 26 in.; coupled wheels, 6 ft. 3 in.; steam pressure, 175 lbs. per sq. in. Heating surface—tubes, 832·5 sq. ft.; firebox, 150 sq. ft.; superheater, 211 sq. ft.; total, 1,193·5 sq. ft. Grate area, 20 sq. ft.

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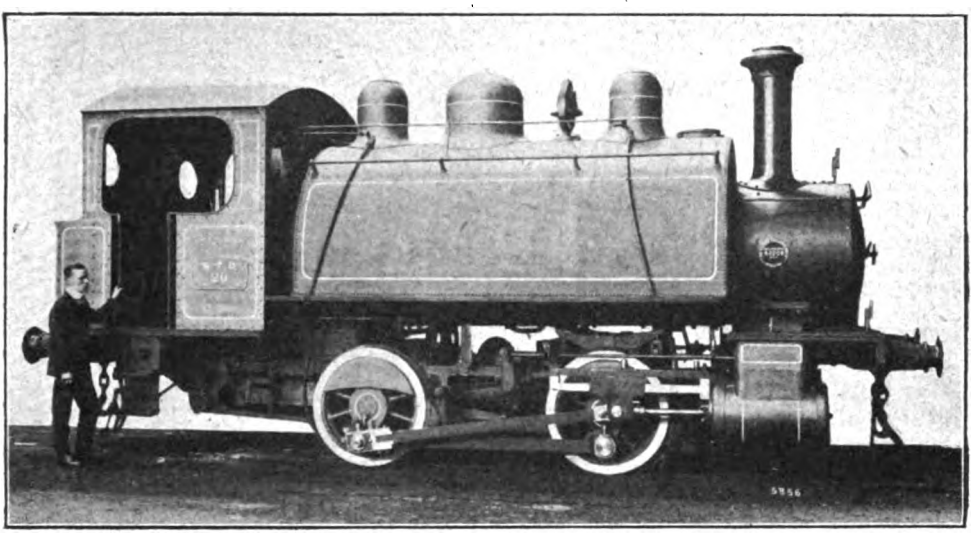

0-4-0 SADDLE TANK LOCOMOTIVE: SUPPLIED TO THE BRITISH GOVERNMENT.

# American Locomotives Recently Built for Export.

FOR many years, an important feature of the work of American locomotive builders has been the construction of locomotives for export. As far as is known, the first American built locomotives to be exported were shipped to Cuba in 1838 by The Baldwin Locomotive Works, of Philadelphia, Pa., U.S.A. In 1840, this company received an order for a locomotive for Austria, and the Norris Locomotive Works, also of Philadelphia, shipped locomotives to England. Thus there was begun a branch of the American locomotive building industry which has steadily grown in importance, until to-day American built locomotives are found in practically every country where railways are in operation.

There are several reasons which account for the early popularity of the American design of locomotive on foreign lines, and the continued constant demand for these machines from abroad. The early railways of Great Britain and Europe were built in a most substantial manner, with comparatively light grades and easy curves, and with tracks, bridges and other structures of a most permanent character. The locomotives as a rule had rigid wheel-bases, and the frames were suspended directly on the springs without the intervention of equalizing gear. In contrast, the early American railways were quickly built; and in order to save expense, cuttings, embankments and tunnels were avoided wherever possible; steep grades and sharp curves were frequent; and tracks were laid with light rails and were poorly surfaced. The European type of locomotive proved too rigid for service on such lines, and American ingenuity accordingly devised, first the swivelling bogie and then the equalizing beam. With these devices, the locomotives successfully negotiated sharp curves and all wheels kept a bearing on the rail, even when passing over very uneven tracks.

The features which characterized American railway construction at that early day are often found in Colonial and newly-developed countries; hence the success which locomotives of American design have usually had in these localities. The principal railways in the United States, as well as in such foreign localities, for instance, as South America, Africa and the Far East, now represent high class construction in every way; but even in Great Britain and on the Continent, the majority of locomotives used in road service are equipped with swivelling bogies and some form of equalizing gear, features which were originally principally characteristic of American practice.

One factor which has frequently influenced foreign roads in favour of American



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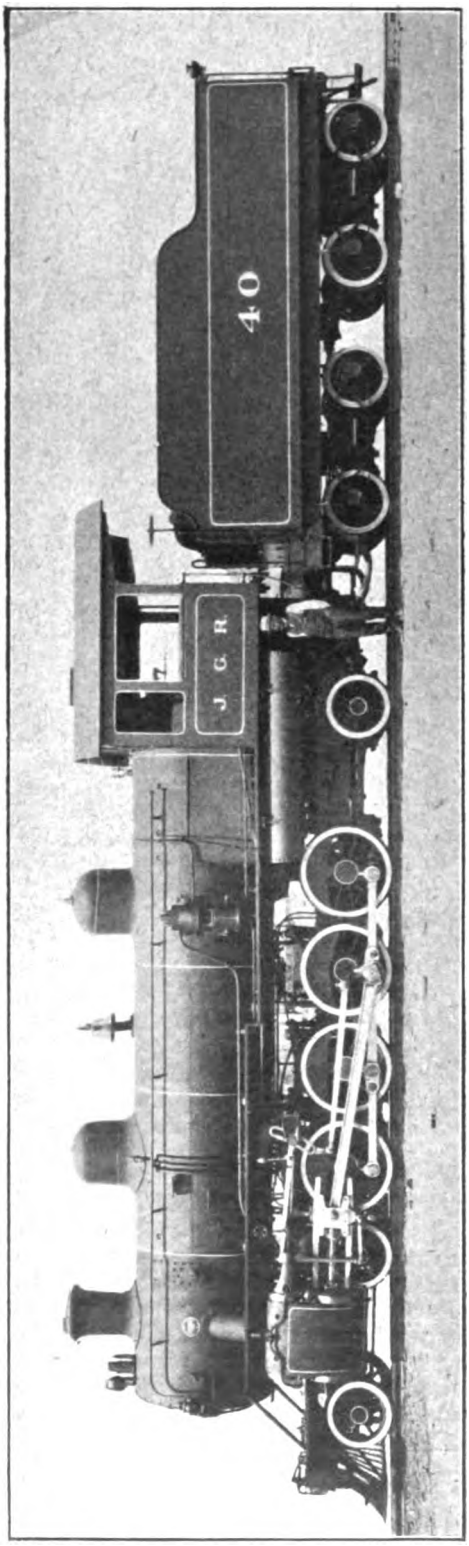


4-8-2 LOCOMOTIVE: JAMAICA GOVERNMENT RAILWAYS.

locomotive builders, is the quick delivery that can be promised. The facilities of the American shops are such that prompt shipment can be guaranteed, while maintaining at the same time a high standard of quality. A number of prominent orders received by American builders from abroad have been placed there chiefly for the reason that prompt deliveries could be made.

An impression has at times existed that American locomotive shops are prepared to build to standard designs only, and that they cannot undertake the construction of locomotives to drawings and specifications furnished by the purchaser. This idea is wholly erroneous. American locomotive builders are constantly called upon to build motive power to designs prepared by the purchasing company; and in filling orders for export they must frequently build to designs which are foreign throughout, and often to drawings prepared on the basis of the metric system of measurements. The builders, therefore, acquire a wealth and variety of experience, which enables them to solve the most difficult railway haulage problems.

The accompanying illustrations represent several locomotives which have been recently built for export by The Baldwin Locomotive Works. The subjects have been selected partly because of their individual interest, and also to illustrate the variety in the types of locomotives which this company builds for foreign countries.

The first illustration shows one of 20 locomotives of the 0-4-0 tank type, built for the British Government. The design is typically American, and represents a type which is extensively used in light switching and industrial service in the United States. The track gauge is standard. As the cylinders are 14 by 22 in., and the coupled wheels 42 in. in diameter, the tractive force exerted, with a boiler pressure of 180 lbs., is 15,700 lbs. This assumes a mean effective pressure equal to 85 per cent. of the boiler pressure. Weight of the locomotive loaded, is 75,400 lbs., all of which is available for adhesion.

The boiler has a diameter, at the front end, of 48 in. and is built of steel plate throughout, including the inside firebox. The fuel used is coal briquettes, which are burned on a rocking grate. The firebox is radially stayed, and the front end of the crown is supported by two rows of Baldwin expansion stays. This stay consists of a radial bolt, which is screwed into the inside

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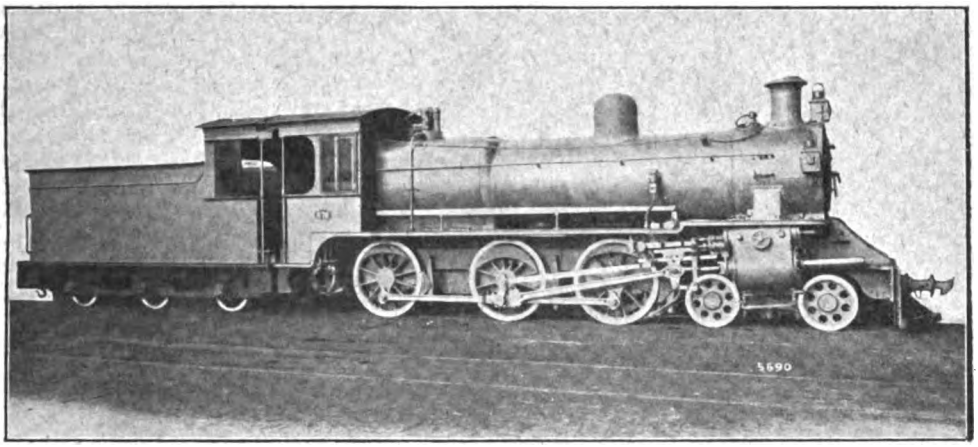
firebox sheet. The nut on the upper end of the bolt is seated in a die-forged stirrup, and this stirrup is tapped into the outside shell. The nut has sufficient clearance to rise from its seat as the crown expands, thus affording the flexibility required at this point. This is a strong, light design of stay, which utilizes ordinary stay-bolt taps in the boiler sheets, and offers a minimum amount of obstruction to the free circulation of water over the firebox crown. In this respect it is preferable to the various forms of T-irons and crown-bars which have been extensively used in the past. These locomotives are equipped with balanced slide valves and Stephenson link motion. Combined steam and hand brakes are fitted. A saddle tank, with capacity for 1,200 gallons

service on grades of 3½ per cent., combined with curves having a minimum radius of 288 ft. To facilitate traversing these curves, the first and third pairs of coupled wheels have bald tires. The leading bogie has a swing bolster, which is hung on three-point suspension links, and has a lateral movement of 4 in. on each side of the centre line. The rear bogie is of the Rushton type, with inside journals, and its springs are connected with those of the coupled wheels by means of equalizing gear. A lateral play of ¾ in. is provided between rails and flanges on all the wheels having flanged tires.

Cylinders of these engines are 19 in. by 26 in., and with coupled wheels 46 in. in diameter and a steam pressure of 190 lbs., the tractive force exerted is 32,900 lbs.




4-6-0 LOCOMOTIVE: SOUTH INDIAN RAILWAY.

is placed over the boiler, while 1,100 lbs. of fuel are carried in the coal bunker back of the cab.

The second illustration represents one of two locomotives of the 4–8–2 type, built for goods traffic on the Jamaica Government Railway. These locomotives are of the same hauling capacity as a number of engines of the "Mikado" (2–8–2) type, previously constructed for this railway by The Baldwin Locomotive Works. The substitution of the four-wheeled for the two-wheeled leading bogie in the new design, has been effected without materially changing the general dimensions of the boiler. By using a sloping firebox throat and placing the front tube sheet farther back from the centre of the cylinders, the same length tubes are used as in the "Mikado" type engines.

The new locomotives were designed for

The steam distribution is controlled by inside admission piston valves, which are 11 in. in diameter and are driven by Walschaerts valve gear. A long hand reverse lever, such as is commonly used in American locomotive practice, is employed in this instance. The boiler has a diameter, at the front end, of 68 in., and the tubes are 17 ft. long. A Schmidt superheater having 24 elements is applied. Superheating surface is 463 sq. ft., and the water evaporating surface 2,236 sq. ft. The grate area is 37·7 sq. ft. These values indicate high steaming capacity in proportion to the tractive force exerted, thus fitting the engines for heavy service where sustained high power must be developed. The boiler, including the inside firebox, is built of steel plate throughout. The firebox contains a brick arch and rocking grate. It is radially

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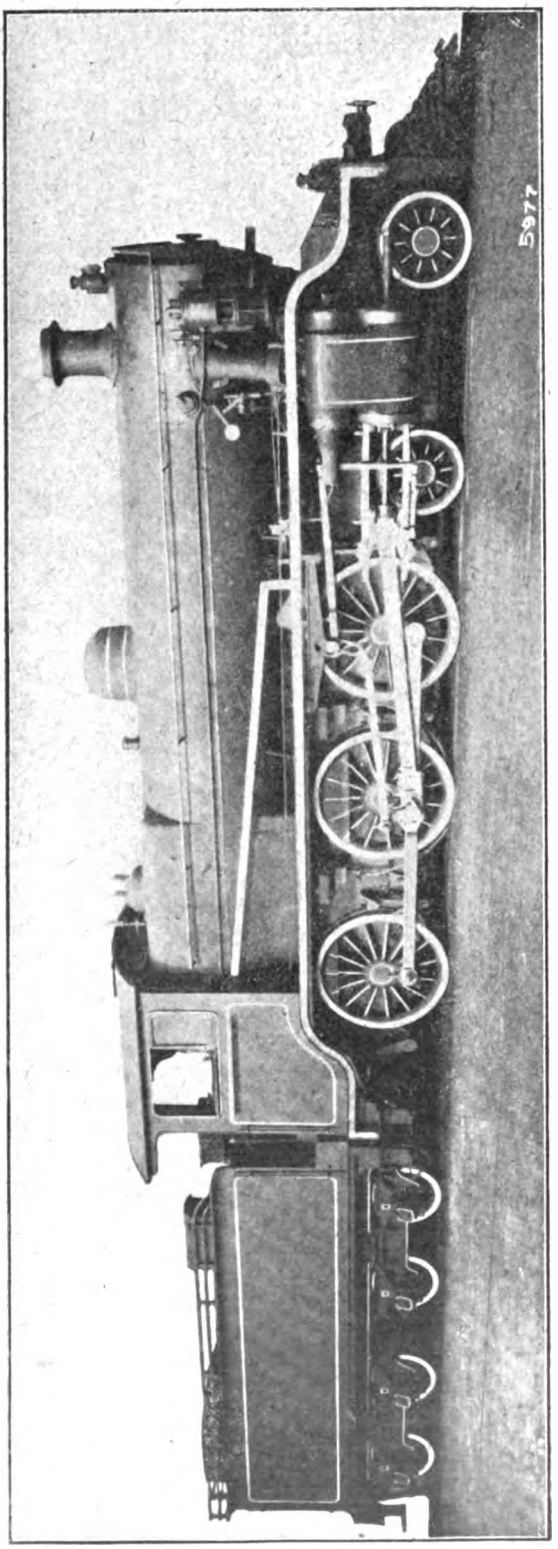


4–6–0 LOCOMOTIVE: CANTON-HANKOW RAILWAY, CHINA.

stayed, and the front end of the crown is supported on two rows of Baldwin expansion stays. There are two courses in the boiler barrel, exclusive of the smoke box; and the dome is mounted on the second course. The longitudinal seam in this course is placed on the top centre line, and is welded throughout its length on either side of the dome opening. The seam is strengthened by inside and outside welt strips. On the first course, the longitudinal seam is welded at the ends only.

These locomotives are equipped with the Westinghouse automatic brake, air being supplied by two 9½ in. pumps. The tender follows American practice in design. It is carried on two four-wheeled bogies, and has a capacity for 3,600 United States gallons of water and five tons of fuel. Weight in working order is 157,400 lbs., of which the coupled wheels carry 114,900 lbs. The tender, loaded, weighs 74,700 lbs. additional. It may be noted, in this connection, that locomotives with this wheel arrangement are being used in the United States, to a limited extent, for heavy passenger and fast freight service.

The ten-wheeled locomotive for the South Indian Railway is one of two metre gauge engines, which were built in accordance with drawings and specifications furnished by the Railway Company. These engines are designated as Class "B." They are suitable for either passenger or freight service. In this case the design throughout is a wide departure from American locomotive practice. With a mean effective pressure equal to 85 per cent. boiler pressure, the locomotive exerts a tractive force of 15,950 lbs., which is slightly greater than one-fourth of the weight on the coupled wheels. This weight amounts to 59,000 lbs.; the total weight of the locomotive is 77,400 lbs., and the tender, loaded, weighs 54,900 lbs.

The boiler has a straight barrel and a Belpaire firebox. The shell is of steel throughout, but the inside firebox is of copper. This material is also used for the stay-bolts in the water legs, while the crown stays

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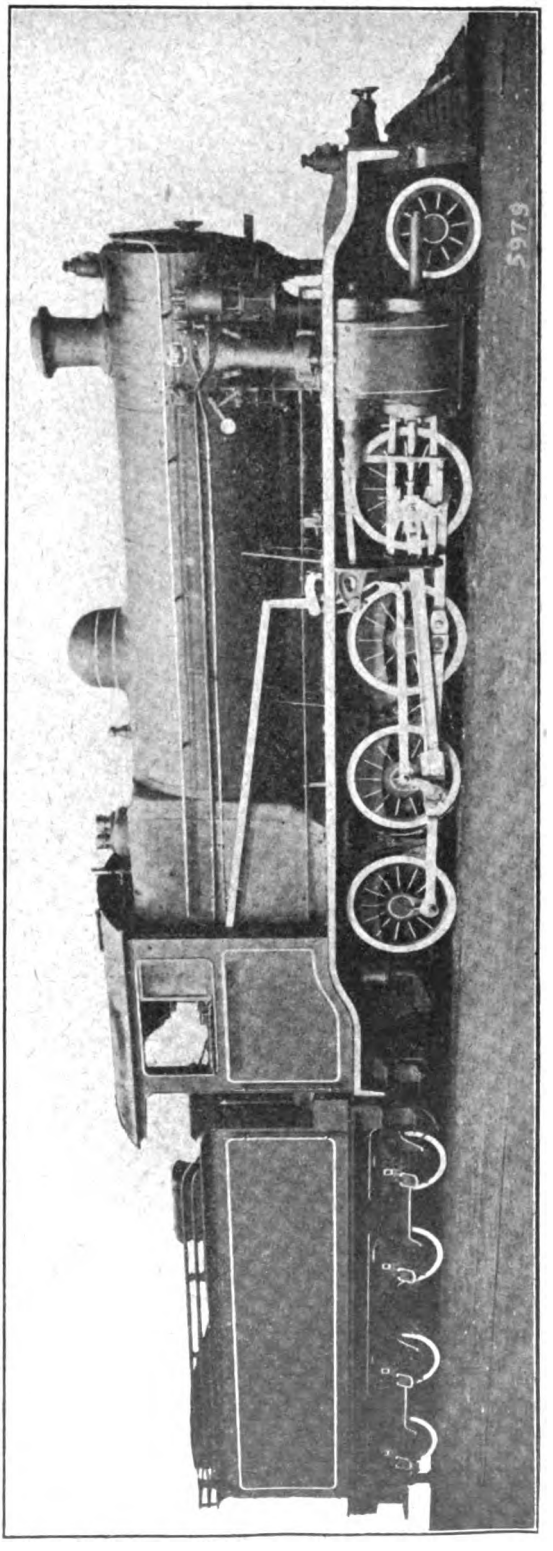
are of steel. The boiler equipment includes a brick arch, rocking grate, one set of Ramsbottom duplex safety valves, and a Schmidt type superheater with fifteen elements. This provides a superheating surface of 207 sq. ft. The water evaporating surface is 821 sq. ft., and the grate area is 16·8 sq. ft. The regulator valve is of the sliding type, controlled by a double ended operating handle. The dry pipe connecting the regulator valve with the superheater head is of copper, while the superheated steam pipes in the smoke box are of steel.

Cylinders are inclined, and the distribution is controlled by piston valves 7 in. in diameter, which are driven by Walschaerts motion. A screw reverse mechanism is applied. The link bearings are bolted to the guide yoke, and the links, therefore, are placed just ahead of the leading coupled wheels. This location allows ample room for a long eccentric rod, but necessitates the use of a short radius rod. The connecting rods drive the second pair of coupled wheels, and they, together with the coupling rods, are of I-section. The journal boxes and the centres of the coupled wheels are of cast steel. The frames are of open-hearth steel plate, strongly braced transversely; each frame being in one piece. The springs of the coupled wheels are underhung.

The bogie has a rigid centre, and bald tires are used on the leading coupled wheels. The Baldwin steam brake is used on the coupled wheels, and a vacuum brake, with train connections, on the tender. A six-wheeled design of tender is used, with plate frames outside the wheels. The tank is wedge-shaped, with capacity for 2,000 imperial gallons; while 5½ tons of coal can be carried. The tender wheels, as well as the engine bogie wheels, have cast steel centres.

Remaining illustrations show three types of locomotives which have recently been built for the Hupei-Hunan section of the Canton-Hankow Railway, China. This order




2-8-0 LOCOMOTIVE: CANTON-HANKOW RAILWAY, CHINA.

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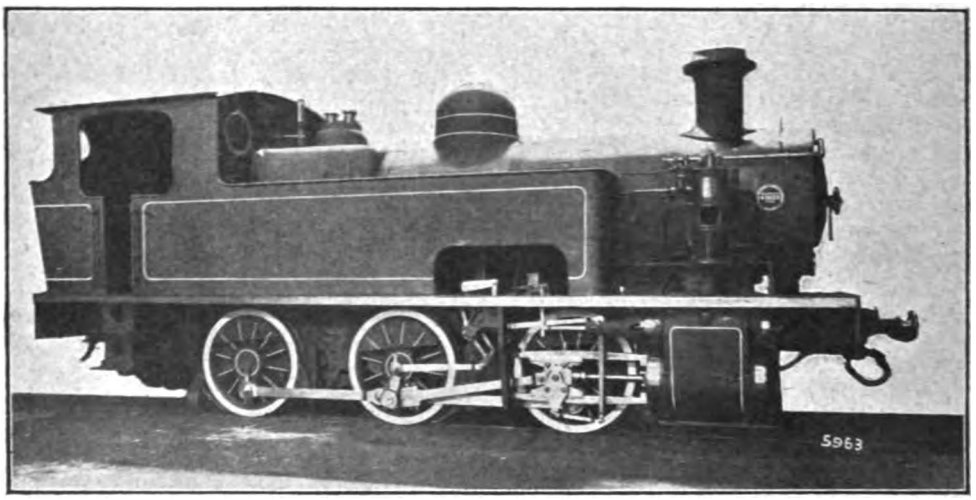
called for ten locomotives, four being of the "ten-wheeled" (4–6–0) type for express passenger service, four of the "Consolidation" (2–8–0) type for heavy freight working and two of the six-coupled (0–6–0) type for switching duties. Although the designs for these engines were prepared by the builders, the general construction is in accordance with specifications furnished by the railway company. It was not required that the locomotives be duplicates of engines already in service, but the three types have been designed to use interchangeable details where practicable. As in the case of the South Indian locomotives, these engines represent a wide departure from typical American locomotive practice. The materials




0–6–0 SWITCHING TANK LOCOMOTIVE: CANTON–HANKOW RAILWAY, CHINA.

used in their construction conform to specifications issued by the American Society for Testing Materials.

The cylinders of the passenger locomotives are 21 by 26 in., and with coupled wheels 66 in. in diameter and a steam pressure of 160 lbs., the tractive force exerted, with a mean effective pressure equal to 85 per cent. boiler pressure, is 23,600 lbs. The cylinders are placed horizontally, outside the frames, and they drive the second pair of coupled wheels. Flanged tires are used throughout, but the four-wheeled bogie has a swing bolster, providing ample flexibility for the curves on the line. Steam distribution is controlled by piston valves 11 in. in diameter. The valve motion is of the Walschaerts type, and a screw reverse mechanism is used on the right hand side of the locomotive. Careful attention has been given to the design of the valve motion, in order to secure the necessary strength and rigidity with minimum weight.

Frames are of steel plate, 1¼ in. thick, and of ample depth. Each frame is in one piece, and the two are spaced 49 in. apart transversely. The cylinder saddle, which, in this case, is cast in one piece, braces the frames most effectively at the front end, while the cast steel foot-plate serves a similar purpose at the rear. Intermediate braces provide the necessary transverse strength. The springs of the coupled wheels are underhung and those of the second and third pairs are connected, on each side, by an equalizing beam. The bogie frames, like the main frames, are of steel plate. The springs are placed over the boxes, and the frames are suspended directly from them, without the intervention of equalizers.

The boiler is of the Belpaire type, with a straight top; and it measures 62 in. in diameter at the front end. The shell and inside firebox are of steel. Two rows of Baldwin expansion stays support the front end of the crown, and the flat sides of the outside shell, above the crown, are braced by two transverse rows of bolts. The boiler contains a Schmidt superheater with 22 elements, providing a superheating surface of 404 sq. ft. The water evaporating surface is 1,781 sq. ft. The firebox has a rocking grate, which extends back over the rear

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coupled axle and has an area of 31·8 sq. ft. The fire-door is operated by pneumatic power. Feed-water is supplied to the boiler by one Weir's pump and heater, and one Metcalf's vertical combination automatic restarting hot water injector.

These locomotives are arranged to use the Lockyer patent regulator. Since, however, this device could not be obtained in time, owing to delays in Great Britain in consequence of the war, the regular Baldwin throttle has been fitted temporarily, and the Lockyer regulator will be applied subsequent to the delivery of the locomotives in China. Cylinders are lubricated by Wakefield's mechanical oil pumps, and the driving-axle journals by one Nathan mechanical oil pump driven from the valve gear. Buckeye-Laycock couplers and draw-hooks are applied, in accordance with the railway company's practice. The locomotives are equipped with the Westinghouse quick acting automatic brake.

The tender is carried on two four-wheeled bogies, with steel plate frames. The tank is wedge-shaped, with capacity for 4,250 imperial gallons. Space is provided for 360 cubic feet of fuel. These locomotives weigh 159,700 lbs. in working order, of which the coupled wheels carry 113,900 lbs. The tender, loaded, weighs 101,000 lbs. additional.

The "Consolidation" type locomotives have cylinders 22 by 26 in., and with coupled wheels 51 in. in diameter and a steam pressure of 160 lbs., they exert a tractive force of 33,500 lbs. They are similar to the passenger engines in construction and equipment. They weigh, in working order, 159,600 lbs., of which the coupled wheels carry 143,400 pounds.

The switching locomotives use saturated steam. Their cylinders are 17 by 24 in., and with coupled wheels 48 in. in diameter and a steam pressure of 160 lbs., they exert a tractive force of 19,600 lbs. These locomotives have no separate tenders, the water supply being carried in two side tanks of 900 imperial gallons combined capacity. A coal box, with a capacity of 75 cubic ft., is placed back of the cab. The total weight in working order, is 100,550 lbs. The equipment and general features of the design, are similar to those of the road engines.

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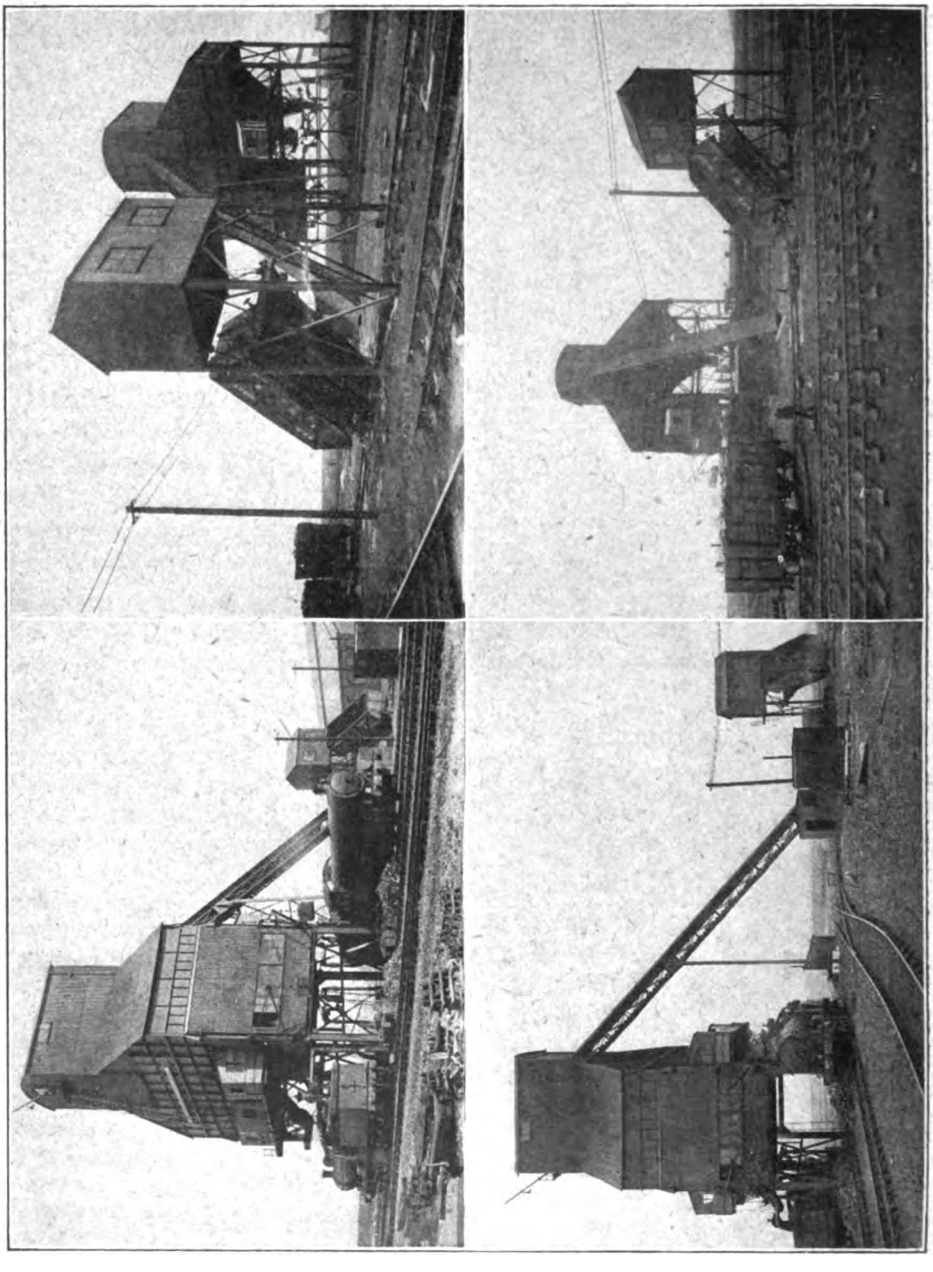
LOCOMOTIVE COALING PLANT AT DAIRYCOATES, HULL: NORTH EASTERN RAILWAY.



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# Locomotive Coaling Plant at Dairycoates, Hull: North Eastern Railway.

AN electric installation including several features of interest has been erected for coaling locomotives at the North Eastern Railway locomotive sheds at Dairycoates, Hull. The installation was designed by the chief mechanical engineer's department, under Mr. Vincent L. Raven, and has been constructed and erected by Spencer and Co., Ltd.

Coal is emptied from wagons into an underground hopper, from which it is mechanically elevated to overhead storage bunkers, provided with shoots for delivering it to individual locomotives as required. All machinery is electrically-driven, current being supplied from dynamos placed in the engine shed machine shop and driven by the shop engine. Reception sidings for loaded coal wagons are on one side, and those for the empties on the other. The connection road passes over a wagon turntable, an underground hopper having a capacity of 20 tons, and a tipper table. These sidings, together with the connecting road, are on a falling gradient of 1 in 95, so that loaded wagons can be lowered by gravity to the hopper for discharging and then run into the empty sidings.

Coal from the hopper falls on to a jigging screen, which passes small coal direct to the elevator, while large coal goes into a crusher which reduces the lumps to convenient sizes, then delivering it on to the elevator. The crusher and jigging screen are driven by means of a motor fitted on a platform in the hopper pit. The elevator consists of a number of light steel buckets or trays fitted so that the leading edge of each is overlapped by the following edge of the preceding bucket, thus forming a continuous belt. This elevator delivers the coal into either leg of a two-way shoot fitted over a storage bunker, divided into two sections of 100 and 200 tons capacity, respectively, to suit the two different classes of coal in general use at this shed. Four delivery shoots, two on each side of the bunker, are provided for coaling locomotives, thus allowing four locomotives to be served simultaneously. Each shoot is furnished with means for measuring the quantity of coal delivered, the capacity of each measure being 10 cwt.

An electrically-driven wagon tipper has been provided for dealing with end-door wagons. The tipper table is hinged at one end and the other end is raised by means of steel wire ropes coupled up to the hoisting drums of an electric winch fitted overhead. Hooks are fitted on the table for gripping one of the axles of the wagon. The tipper is controlled from the ground level by means of "Up," "Down," and "Stop" push buttons fitted on one of the uprights supporting the machinery. Limit switches are fitted at both "Up" and "Down" limits, so that in the event of the operator neglecting to press the stop button, the current will be cut off and the table brought to rest at these predetermined points. Owing to the end door type of wagon being fitted with doors at one end only, it was necessary to provide a turntable. A capstan is provided for turning wagons on the table and also to assist in bringing them to the required positions.

Current is supplied to the installation through overhead conductors, the switchboard being fitted in a building adjacent. Two 15 cwt. electrically-driven coaling cranes have been provided for coaling the locomotives at such times as the elevator is out of use. They are fitted at one end of the overhead bunkers, and are attached to the uprights supporting them. Under normal conditions the average number of locomotives coaled at this shed is about 135 per day, these requiring approximately 275 tons of coal, and as the elevator is designed for a capacity of 50 tons per hour it is only necessary to run the plant during the day-time.



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# The Telephone in Railway Service.

FIG. 1. MASTER STATION.

IN regard to ordinary telephone installations, they are so widely used in all branches of railway service, and they have, moreover, superseded the telegraph for many traffic requirements, that it would be almost superfluous to refer thereto; but there are several special applications for which particular equipments offer peculiar advantages, and it is with those possibilities offered by the "Dictograph Inter-conversing (Automatic) System" that this article is primarily concerned.

Briefly, this is designed to meet certain requirements which apply to most large business establishments, and is particularly suitable for the offices of railway companies and the like. In such establishments it is often desirable for the chief officer—General Manager, Goods Manager, Chief Mechanical Engineer, Superintendent of the Line, etc., or in divisional offices, the Divisional Chief, whatever may be his standing—to be able to confer with other chief officers or with departmental heads, without the semi-publicity and delay attending the ordinary methods, and depending upon the completion of a series of single connections, each of which must be dealt with alone. According to this system, therefore, the General Manager or other chief officer has a "Dictograph" master station—this is of loud-speaking type, so that it is not necessary to use transmitter and receiver in the ordinary way, and a conversation can, in fact, be held several feet away from the apparatus—and this provides automatic connections whereby he can switch himself on to any or all of the departments to which he wishes to speak. Instructions can thus be given to several departments simultaneously, or it is possible for a small conference to be thus held, as each connection can also hear what others may say, as well as remarks made by the Chief himself.

As a means for facilitating business between the chief officers, or for conveying instructions to several departments simultaneously, such an installation therefore offers many advantages. Other features are set forth in the following general description of the apparatus.

The Master Station, illustrated in Fig. 1, is a loud-speaking telephone with a very sensitive transmitter, by means of which the principal can sit at his desk or even walk about the room and carry on a conversation with one or more of his subordinates in any part of the works or offices. A silent receiver is also provided, so that if it is desired the replies transmitted can be kept secret from any one else in the room; the action of lifting the receiver from the hook automatically cuts out the loud-speaking receiver.

The various departments are each provided with an intercommunicating telephone station, as in Fig. 2. These are provided with a receiver, and a similar transmitter as on the Master Station, which is sunk in the box, thus doing away with the ordinary insanitary mouthpiece, and enabling the speaker to carry on a conversation in an ordinary tone of voice several feet away from the transmitter. The "Dictograph" system can be installed with almost any number of points for inter-communication purposes, the usual sizes being 11, 23, 35, 47, 59 or more stations. With this system, communication is established automatically by simply pressing down



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the key corresponding to any desired station. There is no sub-exchange or switchboard and the consequent delay through the operator's inattention, etc.

A sub-station calling the Master Station operates a shutter and buzzer at the Master Station, thus showing who is calling. The Master Station simply throws the key belonging to the station calling, and conversation can be carried on without anyone being able to cut in on the line. Should another telephone call the Master Station at the same time, the corresponding buzzer and shutter operate, but no conversation is possible till the Master Station throws the proper key. If the manager is already speaking and does not wish to be interrupted, he can stop the buzzer by a small switch in front of the Master Station. A sub-station can converse with any number of departments at one and the same time by throwing the various keys. A Master Station calling the sub-station lights a signal lamp, so that if that instrument should already be connected to another sub-department, the executive office would, of course, be given preference.

Another feature of the "Dictograph" system is the provision for obtaining communication with the Superintendent, Works Manager, or other important executive officer, when their duties take them into various parts of the works or premises. A certain predetermined department (usually the least busy) is called up, saying who is wanted and who is calling. This department, by means of a special key, gives a code ring (say, two or three separate rings) simultaneously to every

FIG. 2. DEPARTMENTAL STATION.

department in the works. The result is that whatever department the superintendent is in he will either hear the ring himself or be advised that he is wanted. He can then ring up at the nearest telephone the predetermined department and find out who is requiring him, and upon obtaining such information can immediately place himself in communication with the original department requiring him.

The instruments are usually made as desk instruments, but can also be fitted on brackets as wall-type instruments.

The "Dictograph" system is a new British industry and deserves the recognition due to it by those business men who are alive to the necessity for efficiency in business now required, and which will be still more imperative in the period which will follow the conclusion of the war.

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# British Locomotive Practice and Performance.

By CECIL J. ALLEN.

*Photo*] [*H. T. Wortock.*

LONDON AND NORTH WESTERN RAILWAY.

East Lancashire Express near Watford.
4-4-0 locomotive No. 2061, *Eglinton.*

A SUITABLE month is the last one in the year in which to make some attempt to overtake arrears of correspondence, and though I do not essay to find space in the present article for the large numbers of runs with which correspondents so generously keep me supplied—such a task would require the exclusive use of several consecutive issues of the RAILWAY MAGAZINE—there are certain interesting points outstanding that I wish to mention. These points are somewhat varied, and I will confine myself to the briefest possible comments on each one.

Two letters have reached me in reference to remarks in the October number concerning accuracy in timing. The correspondent whose original letter was quoted writes further to emphasise "the great importance of making all records as full as possible with the means at the observer's disposal, so as to make the record (*a*) as valuable and (*b*) as accurate as possible. Of course," the writer continues, "I do not suggest that records should always be *published* in all their detail and complexity: one only needs then to call attention to the interesting points of the performance, which is what you do. Only, unless the detail is there, the basis of the record is insecure; and the more remarkable and worthy of citation a performance is, the more insecure it is—*i.e.*, the more it stands in need of corroboration." The last is a very important point. It is on such grounds as these that I am often unable to publish details of runs which reach me from correspondents, and which in their achievements put in the shade all the results that I have obtained during a good many years' experience of travelling. Of this character were the collection of runs cited at the conclusion of my references to this topic in October last; none of them was absolutely *impossible* of achievement, I suppose, but the mere unbroken sequence of such record-breaking trips, without corroboration of any sort, is such as to put the gravest suspicion on their authenticity. The latest contribution from this source, by the way, is one in which the "Riviera Limited" of the Great Western Railway strolled into Paddington at the modest hour of 4.32.50 p.m.—over 12 min. early! The intermediate details included such fabulous achievements as a maximum of 92 m.p.h. down Wellington bank, a climb to mile-post 122¾ at 60 m.p.h., and a speed rising from 60 to 67 m.p.h. on the final ascent to Savernake!

Another friend, the initials D.Sc. after whose name are of sufficient importance to warrant his speaking with authority in the matter, writes "It certainly seems almost incredible that you should have received so many obviously absurd statements from



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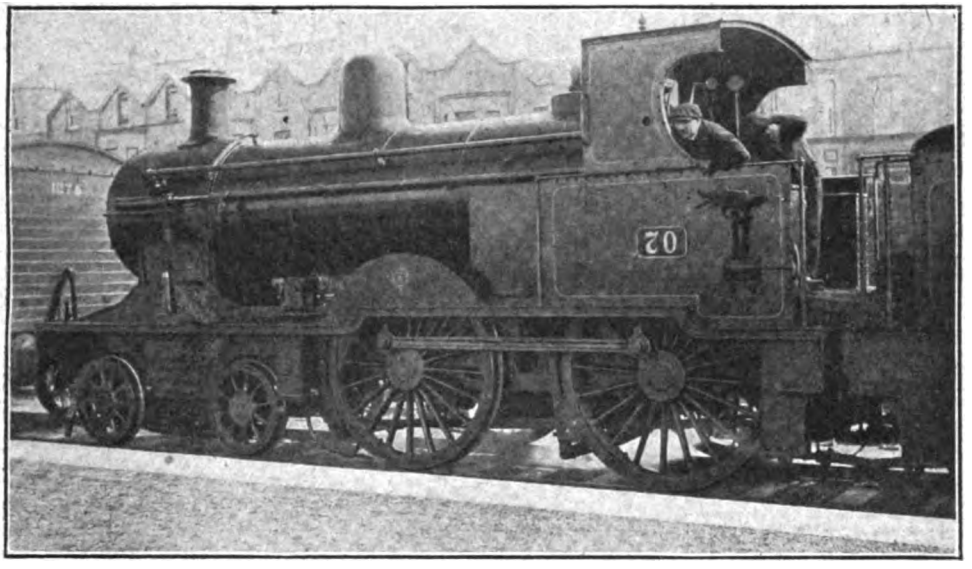
correspondents. On the other hand, perhaps I should not have been astonished at the curious 'facts' which some of your correspondents relate, as I have frequently been struck by the absolute inability of many people of good education to record observed facts with any degree of accuracy, whether these facts be the apparent size of a Zeppelin or the speed of a railway train. Nevertheless, do you not think that many of the published results give an erroneous impression of accuracy—*i.e.*, an accuracy greater than the observations on which they are based? For example, the speed of a train is very often given as 81·8 m.p.h., probably on account of a ¼-mile being timed in 11 sec. Now, if the timing had been 11·2 sec., the speed would be 80·4, and if 10·8, 83·3 m.p.h., and it is obvious that in recording ¼-mile times with a stop-watch reading in fifths of a second, no speeds intermediate between these could possibly be recorded. I prefer in my own accounts to give round numbers such as 80 and 82, instead of 80·4 and 81·8, as the decimals are really non-significant figures. Of course, if the time is taken over a longer stretch than ¼-mile, more accurate figures can be got." There is a great deal in this contention. Giving maximum and minimum speeds in decimals conveys an impression of super-accuracy which is certainly not warranted by the basis on which they are obtained, when ¼-miles are being timed, even though a stop-watch be used. Hitherto I have adhered to this method principally because of the association of the figures concerned with the corresponding stop-watch readings, but in future I think it will be well to adopt the plan of which my friend here speaks, and give the nearest round number only.

To turn to another topic, several letters have reached me concerning the runs given in the September issue on the London, Brighton and South Coast Railway between London and Brighton. It will be remembered that the logs described were taken largely from the collections of two correspondents, and concerning them I remarked that "both my friends who have supplied me with these details are close students of Brighton locomotive work, and I think I shall not be far wrong in saying that these runs represent the 'cream' of their fairly extensive Brighton collections." In this connection one of the gentlemen concerned writes me thus:—"In one sense you are right in thinking that these represent the 'cream' of my collection; that is to say, I doubt if I could produce from my records anything very appreciably superior to these. On the other hand I could match them over and over again. This indeed is a very great feature of Brighton work, that the proportion of runs attaining




*Photo*] [*D. B. Bradshaw.*

MIDLAND RAILWAY (NORTHERN COUNTIES COMMITTEE), IRELAND.
4–4–0 superheater engine No. 70 at Portrush.

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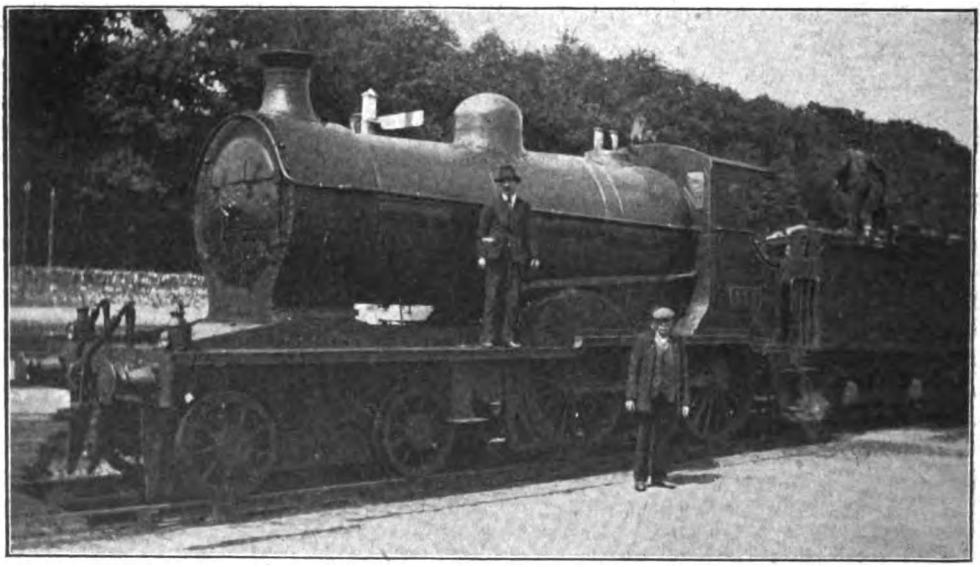
a high level of merit is so considerable. There must be few other lines on which one can take a run at random with so little likelihood of its proving bad or uninteresting." Such a tribute is, in my limited experience of Brighton work, well deserved. I believe this consistent excellence of running arises largely out of making up the time lost through *en route* delays—a matter of considerable importance on a line such as the Brighton, carrying so much long-distance residential traffic, the existence of which depends largely on punctuality of operation. What I have just said about delays is confirmed by another letter which encloses a series of Brighton runs and remarks, "You will see from the foregoing that I have not been exactly fortunate in the matter of delays, only one run providing a clear road, but the Brighton line is always very crowded, so I suppose one must expect delays fairly frequently."

Concerning the position of Clayton and Balcombe summits, the first mentioned correspondent writes :—"I agree with you that it was a pity that your other correspondent and myself took different posts to represent these summits. At the same time his methods appear curious, as it is impossible to see the 45¾ mile-post, which is several chains inside Clayton tunnel; while as for taking mile-post 32 for Balcombe Summit, the gradient post marking the summit is actually *at* mile-post 31¾. You will know how often speed falls off on the last ¼-mile of a long bank, and any minima (so-called) taken on the penultimate ¼ or ½-mile are quite valueless if given without explanation." This explanation appears perfectly convincing, but it will be interesting to hear what my other friend has to say in support of his method, more especially as he once held an appointment in the Engineer's Department of the London, Brighton and South Coast Railway. But as he is at present engaged on railway work in the wilds of Burmah, some time must elapse before he can reply.

From two sources I am reminded of a mistake that, curiously enough, I have made previously in substituting the number 42 for 41, the former being, not an "Atlantic," but a Billinton 4–4–0. Concerning this I have had a most interesting letter from a member of the Egyptian Expeditionary Force who once fired for Driver Tompsett when the latter drove No. 41. "It is with regret that I have to inform you," he writes, "that Driver Tompsett has passed away, only enjoying his well-deserved retirement a few months. I would have given anything to know that he had read your article. I have made several exciting trips with him, and shall always remember his



*Photo]* [*T. Grove White.*

GREAT SOUTHERN AND WESTERN RAILWAY.
4–4–0 locomotive No. 336 at Mallow.

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LONDON AND SOUTH WESTERN RAILWAY: 11 A.M. WATERLOO–SALISBURY.

| Distance | Run No .. .. .. .. .. .. .. | Schedule | 1 | 2 | 3 |
|---|---|---|---|---|---|
| | Engine No. .. .. .. .. .. | | 458 | 444 | 720 |
| | Type, 6 ft. 7 in. .. .. .. .. .. | | *4–6–0 | †4–6–0 | †4–2–2–0 |
| | Driver .. .. .. .. .. .. | | Taylor | White | Geare |
| | Total load (tons) .. .. .. .. .. | | 370 | 240 | 260 |
| Miles. | | MIN. | M. S. | M. S. | M. S. |
| 0·0 | Waterloo .. .. .. .. .. dep | 0 | 0.00 | 0.00 | 0.00 |
| 4·0 | Clapham Junction .. .. .. pass | 7 | 6.52 | 6.30 | 6.37 |
| 7·3 | Wimbledon .. .. .. .. .. „ | — | 10.28 | 10.25 | 10.18 |
| 13·4 | Hampton Court Junction .. .. .. „ | 17 | 16.22 | 16.50 | 16.32 |
| 24·4 | Woking .. .. .. .. .. „ | 28 | 26.55 | 27.50 | 27.02 |
| 33·3 | Farnborough .. .. .. .. „ | — | 36.56 | 37.55 | 36.42 |
| 39·9 | Winchfield .. .. .. .. .. „ | — | 43.20 | 44.25 | — |
| 47·9 | Basingstoke .. .. .. .. „ | 54 | 51.06 *a b* | 52.30 | 51.17 |
| 59·3 | Whitchurch .. .. .. .. „ | — | 67.01 | 64.50 | — |
| 66·4 | Andover Junction .. .. .. „ | 73 | 73.48 | 71.20 | 70.05 |
| 72·8 | Grateley .. .. .. .. .. „ | — | 79.55 | 77.50 | — |
| 78·3 | Porton .. .. .. .. .. „ | — | 85.24 | 83.45 | — |
| 83·8 | Salisbury .. .. .. .. .. „ | 91 | 91.12 | 89.25 | 88.15 |
| 83·8 | Net time (min.) .. .. .. .. .. | 91 | 87½ | 89½ | 88½ |

*a*—Signal-check, Winklebury, 2¼ min. *b*—Permanent way check, Overton, 1½ min. * Superheater. † Non-superheater.

LONDON AND SOUTH WESTERN RAILWAY: SALISBURY–WATERLOO.

| Distance | Run No. .. .. .. .. .. .. .. .. .. | 4 | 5 |
|---|---|---|---|
| | Engine No. .. .. .. .. .. .. .. .. | 445 | 466 |
| | Type, 6 ft. 7 in. .. .. .. .. .. .. | 4–6–0 | 4–4–0 |
| | Load (axles) .. .. .. .. .. .. .. | 56 | 51 |
| | „ (tons) .. .. .. .. .. .. .. | 380 | 360 |
| Miles. | | M. S. | M. S. |
| 0·0 | Salisbury .. .. .. .. .. .. .. dep. | 0.00 | 0.00 |
| 5·5 | Porton .. .. .. .. .. .. .. pass | 10.10 | 12.12 |
| 11·0 | Grateley .. .. .. .. .. .. .. „ | 18.08 | 21.32 |
| 17·4 | Andover Junction .. .. .. .. .. arr. | 25.11 | 28.10 |
| 0·0 | dep. | 0.00 | 0.00 |
| 7·1 | Whitchurch .. .. .. .. .. .. pass | 12.38 | 12.20 |
| 13·9 | Oakley .. .. .. .. .. .. .. „ | 21.11 | 21.19 |
| 18·5 | Basingstoke .. .. .. .. .. .. arr. | 26.44 | 26.53 |
| 0·0 | dep. | 0.00 | 0.00 |
| 8·0 | Winchfield .. .. .. .. .. .. pass | 10.18 | 11.03 |
| 14·6 | Farnborough .. .. .. .. .. .. „ | 16.32 | 17.40 |
| 23·5 | Woking .. .. .. .. .. .. .. „ | 25.33 | 27.03 |
| 28·7 | Weybridge .. .. .. .. .. .. .. „ | 30.08 | 31.31 |
| 35·9 | Surbiton .. .. .. .. .. .. .. „ | 36.33 | 38.08 |
| 40·6 | Wimbledon .. .. .. .. .. .. .. „ | 41.50 *a* | 42.56 |
| 43·9 | Clapham Junction .. .. .. .. .. .. „ | 47.48 *b* | 47.34 *d* |
| 46·5 | Vauxhall .. .. .. .. .. .. .. „ | 51.54 | †52.23 |
| 47·9 | Waterloo .. .. .. .. .. .. .. arr. | 56.06 *c* | — |

*a*—Signals, 15 m.p.h., Wimbledon. *b*—Signals, 8 m.p.h., Clapham Cutting. *c*—Two signal checks. *d*—Signals, Clapham Junction, 2¾ min. † Arrival time.

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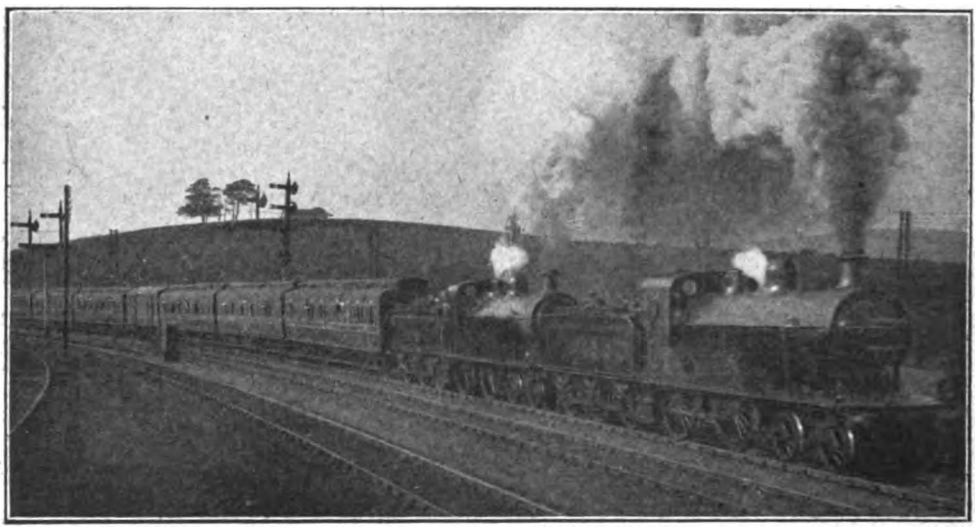
careful handling of No. 41. Driver Ellis has also gone to his last rest."

From another source I hear that Driver Pullen has retired, and that Driver Ingledew has now relinquished express work, and is pilot driving at Brighton. All these names figured in the article referred to, and many of them have been well known in connection with Brighton records for years past. My correspondent in Egypt, by the way, mentions that he would "very much like to see a reference to some of the wonderful work done by the late Mr. Stroudley's 0–4–2 express engines, still running some of the fastest trains after knocking about for twenty and thirty years." There is a very good example of the powers of one of these engines among a small series of Brighton runs that has recently reached me from another friend, and I will not fail to publish this at the earliest suitable opportunity.

Finally I have received several letters relative to the remarks that I made in June last when describing a series of runs on the heavily-laden 2.20 p.m. Anglo-Scottish express from King's Cross, as to the probable line of future locomotive development on the Great Northern Railway, suggesting the likelihood of the 4–6–2, or "Pacific" wheel arrangement, in order that the characteristic Great Northern wide firebox might be retained. "Might not a 2–6–2 type be a suitable solution?" alternatively enquires one reader. "It would have a wheelbase not much greater than a 4–6–0, and the Great Northern Railway 'Wootten' firebox could be retained. Do you know if the Lake Shore and Michigan Southern 2–6–2's have ever had any trouble with their leading pony trucks? That is a possible drawback to the 2–6–2 type for express work." The same argument is advanced in another letter, the writer of which connects the advent of the "Moguls" on the Great Northern Railway, and the successful working of the four-cylinder "Atlantic" No. 279, in the supposition that Mr. Gresley's next express design will be a four-cylinder 2–6–2. There would, of course, be no danger in the use of a leading pony truck at express speeds; in this connection No. 1630, the pioneer Great Northern 2–6–0 engine, was tested, I believe, up to 75 m.p.h., and there are, of course, numbers of 2–4–0 engines with leading radial axles that are run constantly at high speeds. On the other hand, I think it is highly improbable that any new express locomotive type will be turned out in this country without a leading bogie. Further than that the 4–6–2 engine is almost *bound* to make its appearance in this country before many years have elapsed, as it is the only logical development left of the present express locomotive wheel arrangements. If its



*Photo]* [*F. Syers.*

MIDLAND RAILWAY.

Express leaving Hellifield for Liverpool and Manchester. Rebuilt 4–4–0 locomotives Nos. 469 and 398.

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advent does not take place on the Great Northern Railway, which would appear in need of power development at the present time, it will be most interesting to see which company will be the first to make the necessary experiment—apart, of course, from the Great Western Railway, which has already experimented with but has not perpetuated the type.

In turning to performance I want to devote some belated attention to the London and South Western Railway, and to deal with a number of excellent runs that have from Salisbury a stop at Surbiton, with one minute extra allowed. This necessitates the 71·7 miles from Salisbury to Surbiton being covered in the fast time of 78 min., which is only 1 min. more than the allowance of the well-known evening express on Sundays at times slightly later. The raising of the average start-to-stop speed of an express from 50·8 to 55·2 m.p.h. must be an event quite unique, one would imagine, in the annals of war-time alterations. The erstwhile 3.30 p.m. from Waterloo to Plymouth appears now to leave permanently at 3.25

LONDON AND SOUTH WESTERN RAILWAY: 2 P.M. WATERLOO–BOURNEMOUTH.

| Distance | Run No. .. .. .. .. .. .. .. | | Schedule | 6 | 7 | 8 |
|---|---|---|---|---|---|---|
| | Engine No. .. .. .. .. .. | | | 460 | 467 | 282 |
| | Type, 6 ft. 7 in. .. .. .. .. .. | | | 4–6–0 | 4–4–0 | 4–4–0 |
| | Load (tons) .. .. .. .. .. .. | | | 230 | 290 | 235 |
| Miles. | | | MIN. | M. S. | M. S. | M. S. |
| 0·0 | Waterloo .. .. .. .. .. | dep. | 0 | 0.00 | 0.00 | 0.00 |
| 4·0 | Clapham Junction .. .. .. | pass | 7 | 7.05 | 7.25 | 7.26 |
| | | | | | | *a* |
| 7·3 | Wimbledon .. .. .. .. .. | ,, | — | 11.30 | 11.40 | 12.22 |
| 13·4 | Hampton Court Junction .. .. .. | ,, | 17 | 18.33 | 18.12 | 19.46 |
| 24·4 | Woking .. .. .. .. .. | ,, | 28 | 29.42 | 29.22 | 32.01 |
| 33·3 | Farnborough .. .. .. .. .. | ,, | — | 39.45 | 39.50 | 43.19 |
| 39·9 | Winchfield .. .. .. .. .. | ,, | — | 46.30 | 46.52 | 50.31 |
| 47·9 | Basingstoke .. .. .. .. .. | ,, | 54 | 54.36 | 55.18 | 59.23 |
| | | | | | | *b* |
| 56·3 | Litchfield Box .. .. .. .. | ,, | — | 64.17 | 65.32 | 70.20 |
| 66·7 | Winchester .. .. .. .. .. | ,, | — | 73.25 | 75.05 | 80.03 |
| 73·6 | Eastleigh .. .. .. .. .. | ,, | 79 | 78.50 | 80.56 | 86.20 |
| 76·4 | Woodmill Box .. .. .. | arr | — | 81.48 | 84.12 | — |
| | | dep. | — | 83.10 | 84.52 | — |
| 79·3 | Southampton West .. .. | arr. | pass | pass | 91.27 | pass |
| | | dep. | 87½ | 89.03 | 93.56 | 93.16 |
| 81·9 | Redbridge .. .. .. .. .. | pass | — | 92.47 | 99.12 | 97.06 |
| 85·3 | Lyndhurst Road .. .. .. .. | ,, | — | 96.58 | 103.50 | 101.30 |
| 92·8 | Brockenhurst .. .. .. .. | ,, | — | 104.53 | 112.05 | 109.50 |
| 98·6 | New Milton .. .. .. .. | ,, | — | 111.27 | 118.25 | 116.50 |
| 104·3 | Christchurch .. .. .. | arr. | 116 | 117.13 | 124.25 | 123.02 |
| 0·0 | | dep. | 0 | 0.00 | 0.00 | 0.00 |
| 3·7 | Bournemouth Central .. .. .. | arr. | 8 | 8.00 | 8.09 | 7.43 |
| 104·3 | Net times to Christchurch (min.) .. .. | | 116 | 114 | 117 | 121 |

(*a*) Slight signal check, Earlsfield. (*b*) Slight signal check, Battledown.

reached me from correspondents, timed on the line in question. Personally, I have been quite unable to renew my acquaintance with the London and South Western Railway for many months past, owing to pressure of work in other directions, but I hope to be more favourably placed in the immediate future for securing some records of London and South Western locomotive work. In particular I am anxious to try the up West of England express due in Waterloo hitherto at 8.7 p.m., and now one minute later, which has had inserted into its 99 min. schedule p.m., in order to make the extra call at Woking, and this extra allowance of only 5 min. barely compensates for the stop, especially if the load be at all heavy.

The first run I have to mention is one on the 11 a.m. from Waterloo to the West of England, which still preserves its excellent and decidedly difficult booking of 91 min. to Salisbury, a distance of 83·8 miles. My friend who timed this run is a very close student of London and South Western work, and it must be agreed that he is well justified in describing it as a " remarkable " journey.



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*Photo]* [*P. L. G. Essex.*

LONDON AND SOUTH WESTERN RAILWAY.

Bournemouth–Newcastle-on-Tyne (Great Central) train in Boscombe station.
Adams 4–4–0 engine No. 564.

I have given it in skeleton in column 1 of the table, in company with certain other runs of interest on the same train. It is as well that my correspondent should tell his story in his own words. "The train came in to Waterloo," he writes, "to the tune of 11 corridor 8-wheelers and a dining car, weighing empty 343 tons 14 cwt., and the crowd of passengers and luggage must have made the weight fully 370 tons behind the tender. So Taylor, of Nine Elms, and No. 458—a newly-superheated 4–6–0 of the 6 ft. 7 in. type—had a stiff task to reach Salisbury in the allotted 91 min. A fine drizzle was falling, which kept us company all the way down, and made the rails greasy."

"Consequently we did well to pass Clapham Junction in under 7 min., but better was to follow, as we improved on the hard booking of 17 min. to Hampton Court Junction by 38 sec., and actually passed Woking in 26 min. 55 sec., with a maximum of 66·7 m.p.h. at Esher. The minimum of 50 m.p.h. at Sturt Lane was good"—this is the summit point of a 10½ miles climb steepening from 1 in 388 to 1 in 298—"and we accelerated well past Farnborough, touching 63·2 near Winchfield. We maintained a mile-a-minute rate through Basingstoke, which town was passed in the rare time of 51 min. 6 sec., but at Winklebury Box we experienced a most unfortunate signal check, the loss due to which is rather difficult to estimate. I have allowed 2¼ min., but think this is rather on the moderate side, as we were only doing 31·5 m.p.h. at Worting instead of a probable 58. No. 458 recovered well, but past Overton there came another check, this time for re-sleepering, which brought us down to 36 m.p.h. This was not so serious, however, and we ought to have touched more than 70 m.p.h. past Andover. But a smart climb was made to Amesbury Junction, with a minimum rate of 51·4 m.p.h., and a swift subsequent descent, including a mile past Porton at a sustained top speed of 82 m.p.h., helped us to arrive in Salisbury, only fractionally behind time, in 91 min. 12 sec. The times of this run to Woking I have never seen equalled, even with loads of 100 tons less, and I think great credit is due to the driver, who kept time with a very heavy load on a day by no means suited to fast running."

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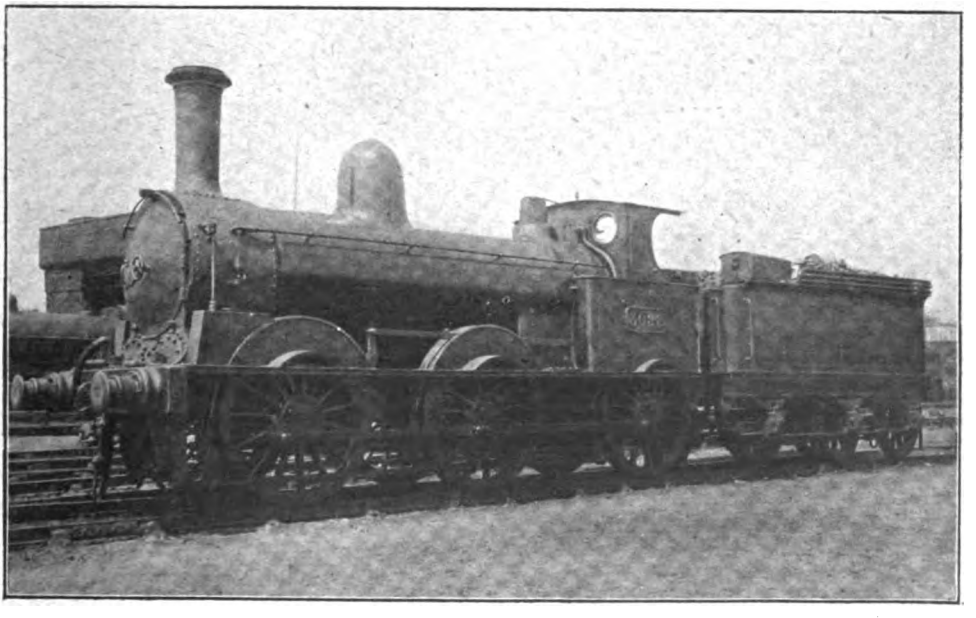
With such laudatory remarks I am in cordial agreement, and my friend's last sentence has made it an interesting task to turn up previous record runs on the same train with the object of discovering the nearest parallels in the matter of time. My own best—and quite a good run at that—appears in column 2. Only in the start and finish, however, was No. 2 run superior in its times to No. 1, despite the very much lighter load. The maximum rates at Esher and Winchfield were both 64 m.p.h., the intervening minimum at Sturt Lane having been 50, as on No. 1 run. Speed fell to 47 m.p.h. at Oakley, rose to 71½ at Andover, fell again to 47 on Grateley bank (4½ miles at 1 in 165 to 264), and rose finally to 80 on the descent to Salisbury. No. 3 run I have unearthed among correspondents' records, and was behind the only large-boilered example of the uncoupled 4-cylinder 4–2–2–0 engines, No. 720, always so ably handled by Geare. The load was far behind that of No. 1 run, but still, for an engine of this type, exceedingly fine work was done, especially from Hampton Court Junction to Farnborough, where the times of No. 1 were caught up and passed. After that the engine was eased, but for all that the 78·2 miles from Earlsfield to Salisbury stop were run in 80 min. exactly. The minimum rate at Sturt Lane was 50 m.p.h., and the maximum at Andover 75½. Until details of the run behind No. 458 reached me the other day, the times on the last-mentioned journey were the fastest that I had seen from Waterloo to both Woking and Basingstoke. The close similarity of the times on the two journeys as far as this point is very noticeable.

In the opposite direction of running I have received from a correspondent now in Nigeria an interesting log of a journey from Devonport to London, made in two halves—the first on the 2.34 p.m. from Devonport to Exeter and the second on the 10.15 a.m. from Exeter to Waterloo. The former of these is interesting in that it covers a section that has not for many years figured in these columns, and also in view of the type of locomotive employed—one of the small-boilered 5 ft. 7 in. mixed traffic engines. A very light load was conveyed—only four 8-wheelers, weighing 103 tons empty and 110 tons full—and the engine was No. 165. From Devonport the 4.7 sharply undulating miles to Tamerton Folliott were covered smartly in 7 min. 10 sec., after which the 4·8 miles on to Bere Alston, mostly ascending at 1 in 73, took 8½ min., and the 6·4 miles thence to Tavistock (stop), also mostly



*Photo]* [*W. H. Whitworth.*

LONDON AND NORTH WESTERN RAILWAY.

DX goods engine No. 3022.

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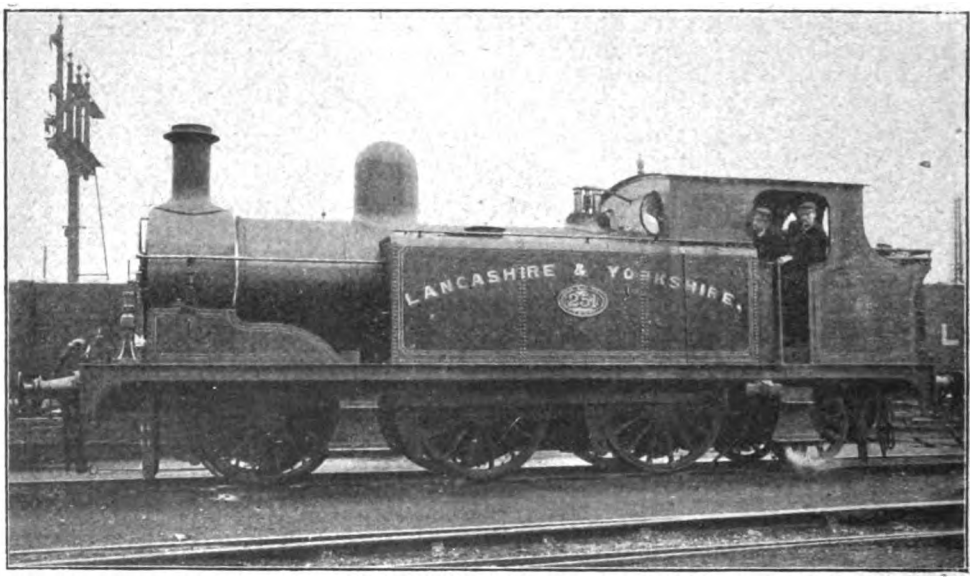
rising, 9 min. 28 sec. Total time to this point, 15·9 miles, was 25 min. 8 sec., against 24 min. booked. From Tavistock to Meldon Summit is a fearsome ascent, 13 miles long, the great bulk of which is between 1 in 75 and 1 in 80, so that No. 165 did fairly well to pass Lydford, 6·4 miles, in 12 min. 35 sec., and Meldon Junction, 13·7 miles, in 23 min. 50 sec. After the usual check over Meldon Viaduct, to 15 m.p.h., Okehampton, 16·3 miles from Tavistock, was reached in 27 min. 55 sec.—again overtime, to the extent of nearly a minute. The schedule allowance for the remaining 25 miles to Exeter is exactly 30 min., but as this distance

Proceeding from Exeter to London the next day, my friend took the 10.15 a.m. train, which now runs on a "War" schedule, with stops at Yeovil Junction and Sherborne on the first stage, in addition to Sidmouth Junction and Templecombe, and at Andover and Vauxhall on the second, instead of a non-stop run. From Exeter the engine was No. 433, one of the large-boilered 6 ft. 7 in. 4–4–0's, and the load one of 5 corridor 8-wheelers, 2 non-corridors, and a restaurant car—207 tons empty and 220 tons full. Unfortunately, the record contains no details of maximum and minimum speeds other than mile-post times




*Photo]* [*W. H. Whitworth.*

LANCASHIRE AND YORKSHIRE RAILWAY.
0–6–2 tank engine No. 251.

is mainly downhill, its observance presents no difficulty, even though speed must be moderated at several points. However, North Tawton, 6·5 miles, was passed in 8 min. 14 sec.; the next 14·2 miles to St. Cyres, with a slack at Coleford Junction, occupied 14 min. 50 sec., and the last 4·3 miles into Exeter (St. David's), with a careful negotiation of Cowley Bridge Junction, 6 min. 8 sec.—a total of 29 min. 12 sec. The net loss to engine was thus only 1¼ min., although as a matter of fact reduced station times resulted in a minute being gained between Devonport and Exeter. Sargent was the driver.

up Honiton bank. The first stage of 12·2 miles to Sidmouth Junction, with its steep 5-mile rise at 1 in 100–170 past Whimple, occupied 18 min. 55 sec., or 55 sec. overtime. Re-starting from the junction, a maximum rate of 50 m.p.h. was attained in the first downhill mile, after which the succeeding 2½ miles' ascent at 1 in 100 reduced the speed to 30·5 m.p.h., and the subsequent ⅝-mile at 1 in 80–90 to 26·8 m.p.h. The flattened ½-mile at 1 in 300–150 just beyond Honiton yielded a temporary recovery to 30·5 m.p.h., while the final rate before the tunnel, on the last mile at 1 in 90, was 24 m.p.h. This was a very fair ascent from the dead start

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—6·1 miles in 11 min. 8 sec. The speed on the succeeding descent was comparatively moderate, as 8 min. 37 sec. were taken to cover the 8·6 miles from mile-post 153½ to Axminster; from there the 10·5 ascending miles to Hewish Box—8½ of which are inclined at 1 in 120–225—were covered in quite excellent style in 12 min. 20 sec., the 11·5 undulating miles thence to Yeovil Junction stop occupying 43 min. 48 sec. Despite this good running, 48 sec. had been lost on the by no means easy allowance of 43 min. for the 36·7 miles from Sidmouth Junction to Yeovil Junction.

The aggregate engine loss of 1 min. 43 sec. was soon made up, however. On the slight ascent to Sherborne 26 sec. were regained, a smart time of only 7 min. 34 sec. being required for this distance of 4·6 miles, start to stop. The 6·1 miles on to Templecombe, also principally ascending, and as steep at first as 1 in 120–80 for 2 miles, took 11 min. 8 sec., start-to-stop, instead of 12 min. allowed. Finally the 28·4 miles from Templecombe to Salisbury were run in 32 min. 19 sec., a gain of 41 sec. on the schedule allowance of 33 min. This included a time of 15 min. 9 sec. for the 10·8 miles to Semley (4 of which have an upward inclination of 1 in 90–130), but the 15·1 favourable miles from Semley to Wilton were covered in 14 min. 22 sec. Time was in this case fractionally improved on, despite what were evidently the most moderate speeds downhill, so that the uphill work on this journey must have been distinctly meritorious, and reflected credit on the driver, Evans.

From Salisbury to London the continuation of this journey furnishes an interesting complement to No. 1 of the series on the 11.0 a.m. down, seeing that the engine was again one of the large Drummond 6 ft. 7 in. 4–6–0 type, which Mr. Urie has modernised with superheating apparatus, while the load beyond Andover amounted to no less than 14 eight-wheelers, or 56 axles. Eight of the latter were non-corridor vehicles, so that the tare load only reached 336 tons, but the heavier proportionate complement of passengers must have brought the gross total up to the 370 tons of the down journey. But from Salisbury the load was only 44 axles, or 310 tons gross, this difference partly explaining the much more rapid start of the 4–6–0 engine from Salisbury as compared with that of the large 4–4–0 of the 463–472 batch, which is tabulated in the adjacent column. But even with 300 tons, and the engine starting cold, the ascent to Grateley was very fair. On the first two ascending miles at 1 in 305–733 out of Salisbury speed rose to 37 m.p.h., and further to a sustained 39 on the 1 in 169 up that follows, but the complete 2¾ miles at the latter inclination reduced the rate to 37 m.p.h. The subsequent mile at 1 in 140 further reduced the speed to 34 m.p.h. On the remainder of the ascent —4⅜ miles at 1 in 245–735–440—speed rose to a sustained 45 m.p.h., falling briefly to 44 at the summit of the bank. From Salisbury to mile-post 73, just beyond the top, the 10·8 miles' ascent occupied 17 min. 47 sec., but the 6·6 miles thence to Andover were covered in 7 min. 24 sec. to the stop. An allowance of only 24 min. is made for the 17·4 miles from Salisbury to Andover, and 71 sec. had therefore been lost on this initial stage.

At Andover the load was made up to 370 tons, as mentioned in the last paragraph, and driver Butler now had his work cut out to keep time, the start from Andover again being very awkward. Of the latter my correspondent gives no details, but the time of 12 min. 38 sec. for the 7·1 miles to Whitchurch, including 2¼ miles up at 1 in 178 and 1¼ at 1 in 194, was a distinctly good one. The further gradual ascent to Oakley, mainly at 1 in 550, occupied 8 min. 33 sec. (6·8 miles), and Basingstoke, 18·5 miles, was reached in 26 min. 44 sec., or in 16 sec. under schedule time. On re-starting from Basingstoke a really brilliant effort was made, the starting time of 10 min. 18 sec. for the 8 miles to Winchfield being quite noteworthy with such a load. After that the 27·9 miles to Surbiton were reeled off in 26¼ min., the fastest section being from Woking to Surbiton, which was covered at an average speed of 67·6 m.p.h. Had it not been for the string of delays in conclusion, there is little doubt that the journey of 47·9 miles into Waterloo would have been completed in 51 min. at the most, and probably less—a substantial reduction in the booked time of 54 min.

Run No. 5 accompanied the run first quoted in this article, and formed my correspondent's return journey from Salisbury on the 4.13 p.m. train. The engine concerned was one of the late Mr. Drummond's most recent and largest 4–4–0 type, No. 466, whose work is generally so successful, but this run was perhaps not quite up to the usual standards. Somewhat sluggish starting when "cold" is, however, rather a feature of the performance of these engines, and of this the exit from Salisbury affords ample

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evidence, no less than 14 min. 35 sec. being taken for the initial 7 miles, and 21 min. 32 sec. to Grateley, 11 miles. The highest speed reached in the ascent was 34 m.p.h., but the minimum at Porton, on the 1 in 140, was 28·3 m.p.h. A faster descent was made from Grateley to Andover than in the previous run, with a maximum rate of 65·5 m.p.h., but over 5 min. were dropped on the difficult booking of 23 min. from Salisbury. In comparing this run with No. 4, it should be remembered that the load was 50 tons less than that of the latter, although the difference is barely such as to warrant the great disparity in time. From Andover, however, the work performed was very similar to that of the previous run, being faster, indeed, to Whitchurch, although slightly slower beyond, but as the booked time of this train is only 25 min. for this stretch, there was a further loss of nearly 2 min. The lowest speed on the 1 in 178 was 35 m.p.h. After Basingstoke the 4–6–0 engine had decidedly the best of it, gaining 1½ min. on the 4–4–0, although the latter regained a fraction of the arrears by a maximum speed of 73·5 m.p.h. beyond Woking. Elsewhere the maximum rate at Winchfield was 65·5 m.p.h., and the minimum at Sturt Lane 57·5, while a speed of 59 m.p.h. was maintained past Wimbledon. Then came the Clapham check, without which the net time to Vauxhall would have been 49¾ min., or only ¾-min. over schedule. My friend speaks rather unkindly of this run in an accompanying letter, but as the load was very heavy for such tight bookings, and there was also the hindrance of a stiff north wind and a greasy rail, I do not think the driver of 466 did so badly.

I have next three runs to give on the 2.0 p.m. from Waterloo to Bournemouth—the only 2-hour express now remaining on the Bournemouth service, and even then not a true 2-hour train, as 6 min. extra has to be allowed for the Christchurch stop. The last of these runs reaches me from the correspondent last quoted, and the other two from another friend. No. 6 run is the best of the bunch, the large 4–6–0 engine No. 460 doing excellently to lose only 1 min. 13 sec. to Christchurch, despite a dead stand of 1 min. 22 sec. for signals at Woodmill Box. The start to Basingstoke pales somewhat in comparison with the three runs on the 11.0 a.m. down, but first-class running followed. On the 6 miles of 1 in 249 past Worting the lowest speed was 48·7 m.p.h., and the long descent past Winchester produced a maximum rate of 82 m.p.h., the average speed from Winchester to Eastleigh working out at 77·5 m.p.h. Then came the Woodmill stop, which cost fully 3½ min. But the engine recovered remarkably well, the average speed of 53·8 m.p.h. over the 16·7 sharply undulating miles from Redbridge to New Milton, including 4 adverse miles inclined between 1 in 103 and 250, being particularly good. Thus a full minute was regained between Northam Junction and Christchurch, and with smart station work at the latter town, Bournemouth was reached only 34 sec. behind time.

On the second run (No. 7) the load was substantially heavier, consisting as it did of eleven 8-wheelers, or fully 290 tons, and No. 467—another large 4–4–0 of the last Drummond batch—although probably running proportionately as well as the 4–6–0, was compelled by shortage of water to replenish the tanks at Southampton West, while, strangely enough, exactly the same signal stop occurred at Woodmill Box. With these two serious delays the total loss of time was nearly 8½ min. The manner in which the times of this run and those of No. 6 pass and re-pass each other in the early stages is very curious. Thus the 4–6–0 was the faster out to Clapham Junction, but the 4–4–0, with an average speed of 51 m.p.h., between mile-posts 5 and 10, and 59·2 between posts 10 and 18 had got 21 sec. ahead at Hampton Court Junction, and remained exactly so as far as Woking. But the smaller engine fell behind again up to Sturt Lane, dropping to 47·3 m.p.h. on the final 1 in 298 against 51·3 m.p.h. on the preceding run. The speeds beyond were also consistently lower, the minimum at Worting being 45·6 m.p.h., while the sustained rate from Winchester to Eastleigh was 72·4 m.p.h. After the two stops no further work of note was performed, other than the very fine average of 57·2 m.p.h. between Lymington Junction and New Milton, where the 4–6–0 was beaten by 19 sec.

A small 4–4–0 figured in the last run (No. 8), and, as might be expected, was not able to keep time, although a rather more creditable start to Basingstoke might have been looked for, and even the maximum rate of 72 m.p.h. past Winchester was capable of improvement. From Eastleigh to Christchurch, however, No. 282 just managed to improve on schedule, while the time of 7 min. 43 sec. from Christchurch up to Bournemouth, start-to-stop, was quite brilliant, and the fastest of the series.

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In conclusion, I am quoting from a letter received recently from a regular correspondent of some years past, as illustrating the possibilities of the earlier Adams 4–4–0 engines on the London and South Western Railway. "The next time you are writing an article dealing with the work of old type engines," the letter runs, "the following runs which I had yesterday on the London and South Western Railway behind engines of the old outside cylinder 4–4–0 class may be of interest. I was journeying to Brockenhurst by the 12.30 p.m. Bournemouth express. The load was 53 axles, or say 375 tons, as the train was packed from end to end, and people were standing in the corridors throughout its length. The engine was No. 420 of the ordinary large-boilered 4–4–0 type, but something went wrong with her, and after crawling into Surbiton she was detached. We were taken on to Woking by No. 620, an old 0–4–2 engine, the 12·4 miles taking 23 min. 20 sec. start-to-stop."

"At Woking No. 620 was detached and replaced by No. 565, of the outside cylinder 4–4–0 class, and this engine then made a most creditable run in all the circumstances, doing the 54·9 miles from Woking to Southampton West in 72 min. 30 sec. The intermediate times were these :—

| Miles. | | | M. S. |
|---|---|---|---|
| 0·0 | Woking .. | .. dep. | 0.00 |
| 8·9 | Farnborough .. | .. pass | 17.45 |
| 15·5 | Winchfield .. | .. „ | 25.55 |
| 23·5 | Basingstoke .. | .. „ | 36.05 |
| 33·8 | Micheldever .. | .. „ | 51.50 |
| 42·3 | Winchester .. | .. „ | 59.00 |
| 49·2 | Eastleigh .. | .. „ | 64.40 |
| 54·9 | Southampton West .. | arr. | 72.30 |

"The time of 12 min. 50 sec. for the 15·4 miles Micheldever to Eastleigh, and especially the Winchester–Eastleigh section—6·9 miles in 5 min. 40 sec.—was very good. At Southampton three more carriages were added, bringing up the load to 460 tons, or 65 axles, and with this tremendous train, No. 565 covered the 13·5 miles to Brockenhurst unassisted in 22 min. 35 sec."

"Returning by the 5.42 p.m. from Brockenhurst, we again had No. 565, with a load of 39 axles, or 275 tons, which ran from there to Southampton in 18 min. 55 sec. But the long climb from Eastleigh to Litchfield Summit proved too much for the engine, or perhaps water was running low"—more probably the arrangement was one of working convenience, in order that No. 565 might return to her shed—"as we stopped specially at Basingstoke, where No. 565 was detached. The times from Southampton to Basingstoke were :—

| Miles. | | | M. S. |
|---|---|---|---|
| 0·0 | Southampton West .. | dep. | 0.00 |
| 5·7 | Eastleigh .. .. | pass | 10.30 |
| 12·6 | Winchester .. .. | „ | 22.00 |
| 21·1 | Micheldever .. .. | „ | 38.15 |
| 31·4 | Basingstoke .. .. | arr. | 45.15 |

"At Basingstoke another engine of the same class, No. 682, was put on, and gave a very fine exhibition of speed on the easy gradients, practically achieving even time at Surbiton. The 46·5 miles from Basingstoke to Vauxhall were covered in 49 min. 55 sec. actual time, or about 49 min. net, there having been a signal check at Clapham. Intermediate times were as follows :—

| Miles. | | | M. S. |
|---|---|---|---|
| 0·0 | Basingstoke .. .. | dep. | 0.00 |
| 8·0 | Winchfield .. .. | pass | 10.30 |
| 14·6 | Farnborough .. .. | „ | 16.55 |
| 23·5 | Woking .. .. | „ | 25.05 |
| 28·7 | Weybridge .. .. | „ | 29.35 |
| 35·9 | Surbiton .. .. | „ | 36.20 |
| 43·9 | Clapham Junction .. | „ | 45.30 |
| 46·5 | Vauxhall .. .. | arr. | 49.55" |

I am very much indebted to my friend for thus bringing to light so excellent a piece of work on the part of a "veteran." All circumstances considered, it is fully entitled to rank with the best of the runs that have been described in this article.

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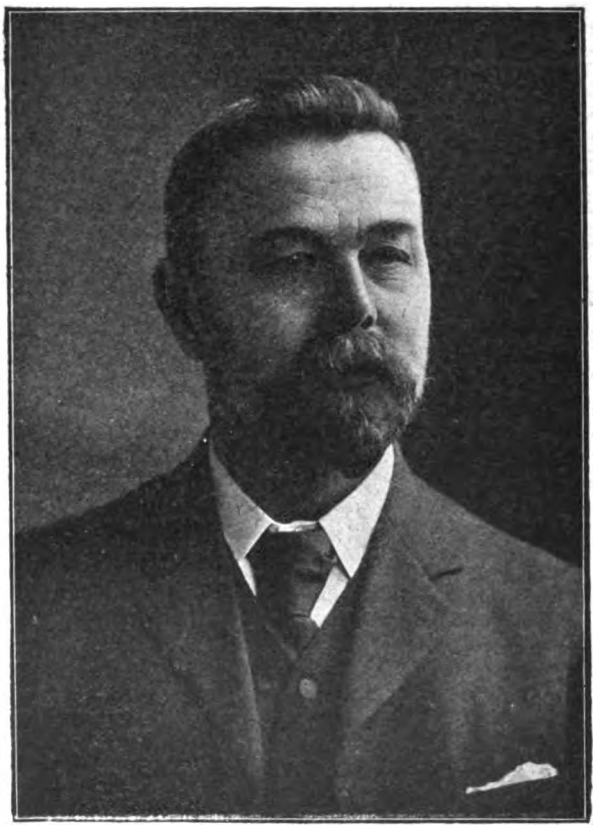
# RAILWAY PORTRAIT GALLERY.



*Photo]* *[Lafayette.*

## MR. THOMAS KEELING,

**Chief Engineer, Glasgow and South Western Railway.**

MR. THOMAS KEELING, who has been appointed Chief Engineer, Glasgow and South Western Railway, in succession to Mr. Melville, retired, was born at Derby in 1860, and educated at the British School, Derby, where special attention was given in the teaching of science and drawing under the headmaster, the late Mr. Wm. Crowther. He was also a student of the Derby School of Art, under Mr. T. C. Simmonds. In 1877 Mr. Keeling entered on his engineering training with Messrs. Handyside, engineers and bridge builders, Derby. After several years in the drawing office, he was in the works for two and a half years, acting as Assistant to the Works Manager. While with Messrs. Handyside he continued the study of science subjects applicable to engineering at the Derby Science Classes under the control of the Science and Art Department. He joined the Glasgow and South Western Railway in 1882 as an expert in structural work, and has since that time been responsible for the design and details of all iron and steel work, and has taken a leading part in other important works of the Engineer's Department. He was 22 years ago appointed principal Assistant to the Chief Engineer.



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# Locomotive and Train Working in the latter part of the 19th Century.

## NORTH EASTERN RAILWAY. [No. II.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

(*Continued from page* 336 *November* RAILWAY MAGAZINE.).

I HAD a few trips on the footplate of the old "Fletchers" in the 'eighties, but I have not kept any records of their speed performances, but amongst Mr. Rous Marten's records of the years 1884-5 I find that one of the 17 in. by 24 in. engines took the Scotchman with a load of 180 tons from Newcastle to York, 80¼ miles, in the net running time of 92 min., gaining no less than 10 min. On another occasion a similar engine ran from Darlington to York, again with 180 tons, 44¼ miles, in 48 min., an average speed start to stop of 55½ miles per hour. They were really excellent engines, certainly amongst the fastest running coupled engines of that period. But their principal merit within my own observations was the ease with which they did their work. There was an easy exhaust and no throwing out of unburnt fuel, and consequently they were very economical coal consumers. The blast on the fire was softened materially by the use of what the old North Eastern men called "exhaust cocks." These were fitted to the cylinders in such a way that when the cock was opened from the footplate a portion of the exhaust was diverted from the blast pipe and turned directly into the atmosphere underneath the cylinders. These "exhaust cocks" were an essentially Fletcher feature and were fitted to nearly all North Eastern engines, both passenger and goods.

As excellent examples of coal consumption during the period 1884-5, I add the following records of the Fletcher engines at Gateshead for a month's work:

LINK NO. 1—NEWCASTLE AND EDINBURGH.

| Engine. | Mileage. | Lbs. coal per mile. | Average number of coaches. |
|---|---|---|---|
| 153 | 4,497 | 30·2 | 11 |
| 167 | 3,307 | 27·6 | 10 |
| 265 | 4,905 | 26·3 | 11 |
| 844 | 4,753 | 28·7 | 12 |
| 845 | 4,799 | 24·9 | 16 |
| 847 | 4,914 | 24·9 | 16 |
| 851 | 5,095 | 29·3 | 11 |
| 853 | 3,080 | 31·6 | 12 |
| 903 | 4,761 | 28·3 | 11 |
| 924 | 4,129 | 29·0 | 12 |
| 925 | 3,776 | 30·8 | 12 |
| 1464* | 4,400 | 28·0 | 11 |
| 1477* | 5,054 | 29·8 | 13 |
| Average | 4,421 | 28·4 | 12¼ |

LINK NO. 2—NEWCASTLE, YORK AND LEEDS.

| Engine. | Mileage. | Lbs. coal per mile. | Average number of coaches. |
|---|---|---|---|
| 365 | 4,320 | 29·7 | 13 |
| 366 | 4,468 | 30·8 | 12 |
| 367 | 4,350 | 31·1 | 13 |
| 368 | 4,871 | 28·1 | 12 |
| 640 | 4,110 | 26·9 | 12 |
| 848 | 4,500 | 28·6 | 12 |
| 901 | 5,044 | 29·7 | 13 |
| 910 | 4,685 | 27·7 | 13 |
| 926 | 4,591 | 26·7 | 12 |
| 927 | 4,026 | 28·6 | 13 |
| 929 | 3,389 | 33·9 | 12 |
| 930 | 4,816 | 32·0 | 12 |
| 1463† | 4,187 | 31·0 | 13 |
| Average | 4,412 | 29·5 | 12½ |

It will be seen from the above that the engines each averaged about 53,000 miles per annum on a consumption of less than 29 lbs. of coal per mile, with a mean load of 160 to 170 tons.

It should be observed that several of the illustrations in the November number show the double ejector of the old Smith's *simple* vacuum brake. For several years this was the only brake used on the East Coast Joint expresses, and all the Fletcher 7 ft. express engines constructed before 1882 were fitted with it. The North Eastern adopted the

* Engine 1464 was afterwards numbered 75. Engine 1477 was originally 485, and subsequently became No. 1325.

† Engine 1463 had been No. 19, and after running for about eighteen months as 1463 was again renumbered 19.



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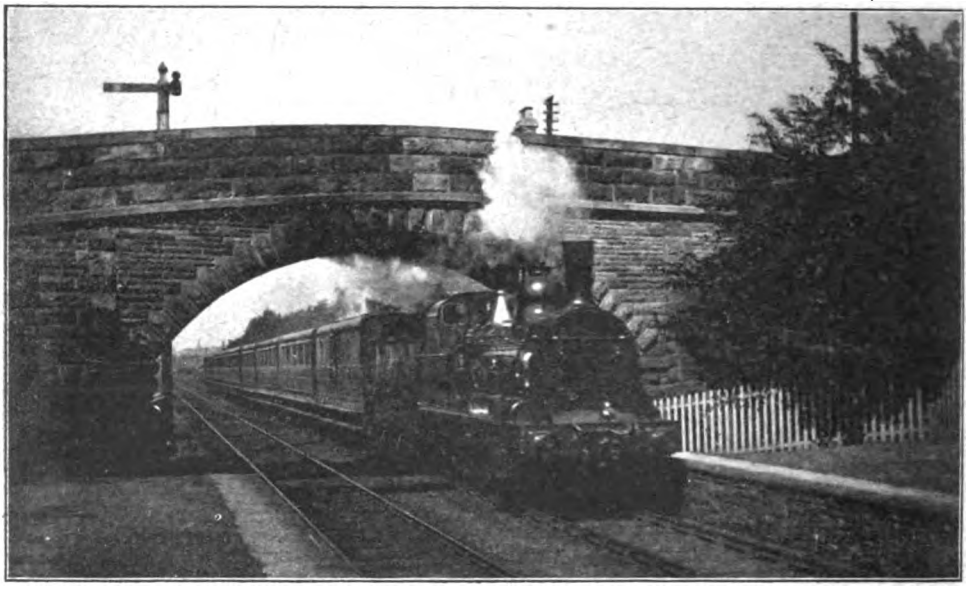
Westinghouse brake about 1880, and gradually its use extended to the East Coast Joint Stock trains, which were subsequently fitted with the combined brakes, the Westinghouse for use north of York, and the automatic vacuum for use on the Great Northern south of York.

In the 'nineties, as the heavier 4-4-0 engines of Mr. Worsdell gradually replaced them, the 7 ft. Fletchers were one by one transferred to lighter duties and other stations. A number went to Saltburn, and worked to Darlington and Tebay, and some at Hartlepool ran on the line to Harrogate and Leeds. Eventually they were distributed all over the North Eastern system, and I regret to have to add that during the last three years a large number of the 1872-5 engines have been broken up after more than 40 years hard work. No. 178 was the unfortunate engine of the class, for on August 10th, 1880, she ran off the road at Berwick with the Scotch express, and again on November 2nd, 1892, the same engine was running the up Scotchman from Newcastle to York when she collided with a mineral train at Manor House cabin, near Thirsk. No. 905 was one of the engines in the Northallerton smash in 1894.

That the Fletcher 7 ft. coupled engines were capable of really excellent work even in recent years is proved by the following account of a run in 1907 furnished to me by a friend. The train was the famous Newcastle to Sheffield express booked to run the 44¼ miles from Darlington to York in 43 min. The train engine had to be detached at Darlington owing to a hot axle-box, and its place was taken by the Fletcher 7 ft. engine No. 844. Leaving Darlington at 1.13½, Thirsk was passed at 1.38½ and the train stopped at the south end of York station at 2.1. Certainly time was dropped, for the run was made in 47½ min., but the weather was rainy with a west wind, and the load was 200 tons, much in excess of the East Coast express loads of the 'seventies, for which these engines were designed.

Apart from the main line between York and Edinburgh the North Eastern had some important cross country services, amongst which that between Leeds, York and Scarborough may perhaps take first rank. The feature of these trains was the curiously uneven time allowances over the various sections. From Leeds to York there were in the early 'eighties four principal fast trains, which covered the 25½ miles in 40, 50, 50 and 45 min. respectively. But these timings, it should be noted, included the allowance for a 3 min. stop at the old York ticket platform. The 9.5 a.m. from Leeds held the honours with its 40 min. allowance, but there was no valid reason why the 5.30 p.m.



*Photo]* [*Locomotive Publishing Co., Ltd.*

NO. 153 (7 FT. 2-4-0) FLETCHER ENGINE ON UP ANGLO-SCOTTISH EXPRESS, PASSING LOW FELL (1882).

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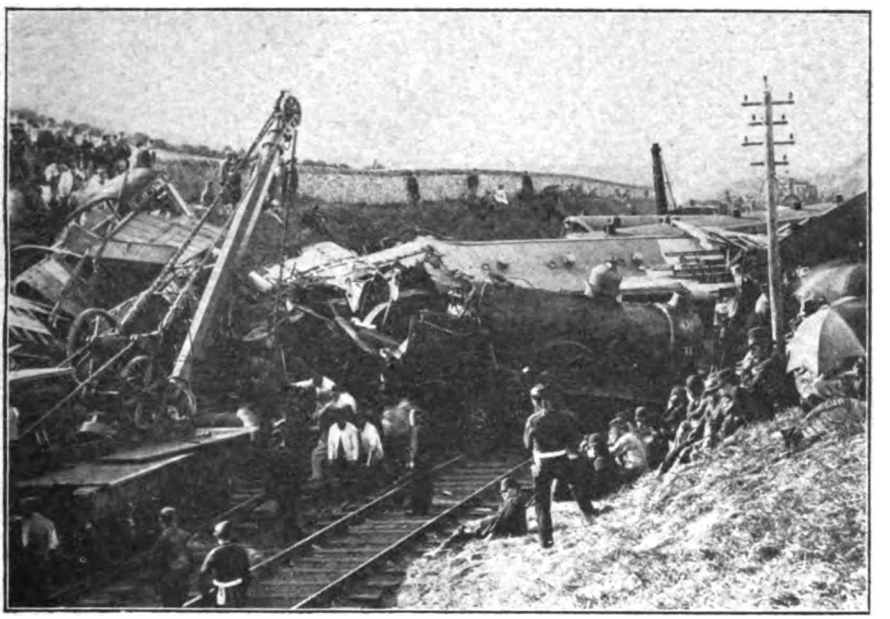
Scarborough express, by which the business people travelled, should not have covered the distance in a similar time, for it was certainly the most important train of the day. The 9.5 a.m. from Leeds, however, was a North Eastern attempt to compete with the Midland for Edinburgh traffic, for it connected with the morning express from York to Newcastle and the North. Between York and Scarborough (42 miles) the best down train, the 5.30 p.m. from Leeds, made the journey in 1 hour 5 min. with a stop of 3 min. at Malton, but the London express, 6.5 p.m. from York, required 1 hour 10 min. under exactly similar conditions. Three other fast trains took 1 hour 15 min. with stops at Malton and Seamer Junction, except that one of the three put in an additional stop at Rillington Junction. One other train did not trouble itself with Rillington, but took 1 hour 20 min. with the Malton and Seamer stops.

On the up journey there were four fast trains from Scarborough, each of which stopped one minute at Malton. Two of these took 1 hour 10 min. to York and the other two 1 hour 15 min.

From York to Leeds there were three fast trains timed as far as the Leeds (Marsh Lane) stop, 24¾ miles, in 42 min., the only instance of any regularity of timing over the same section. This must have been an oversight on the part of the gentleman responsible for the working time-tables, which I feel sure would have been corrected, had his attention been drawn to the matter. In 1883 some improvement was made between York and Scarborough, for one train in each direction made the run in one hour without a stop.

Nevertheless all these trains were somewhat better than they appeared on paper, for all of them put in a call at a ticket platform, either at Scarborough or at York. The North Eastern of those days without its ticket platforms was like a ship without a rudder: at least this would appear to have been the case, for wherever there was a nice open space the "land development committee" of the company promptly filled it up with a ticket platform. If one took a journey of any length on this railway there was very little of the original ticket left at the end of it. The North Eastern collectors of that period were the most expert ticket whittlers that the country possessed.

In dealing with each section and district I will endeavour to give some small idea of the various types and classes of engines used, though in the case of the North Eastern it would be manifestly impossible to describe more than a fraction of the innumerable types.



NO. 178 AFTER THE BERWICK ACCIDENT.

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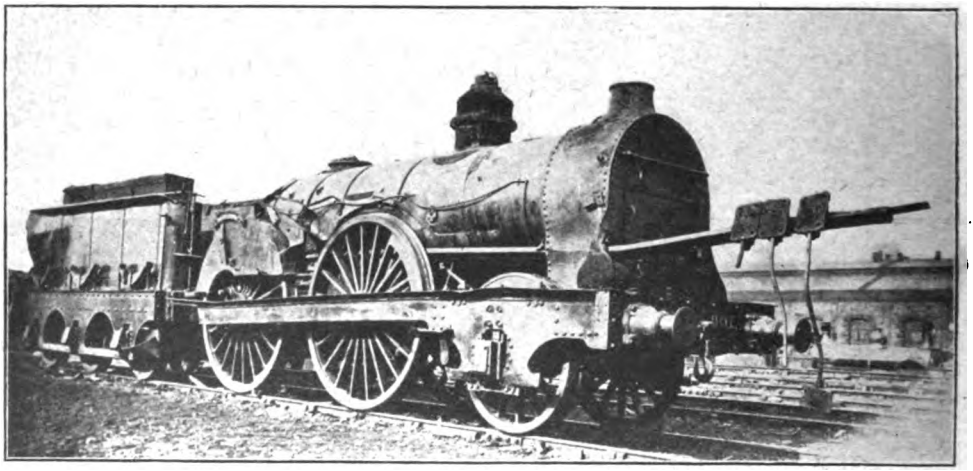
A large proportion of the Leeds and Scarborough trains were run by the Scarborough engines, of which there were ten belonging to six different classes, but which nevertheless all worked in the same link to Leeds. Chief amongst these were four 2–4–0 engines with double frames and 6 ft. 6 in. coupled wheels, and two almost similar engines with 6 ft. coupled wheels. The cylinders were 16 in. by 22 in., but some had these subsequently enlarged to 17 in. diameter. The 6 ft. 6 in. engines were Nos. 25, 26, 250 and 257, and the two 6 ft. engines Nos. 29 and 286. They were all very similar to No. 29 illustrated on page 400. But they all differed in various details from each other, more especially in the safety valve covers, and afterwards, when several were rebuilt in 1880 to 1883 at Gateshead, York or Leeds, of Beyer, Peacock's design and construction (1870), but the other, No. 699, by Messrs. R. Stephenson & Co. (1870) was of very different outward appearance. This engine was one of the only two passenger engines which I remember on the North Eastern Railway (the other being No. 698, stationed at York), which had polished brass domes.

Finally there was the spare engine No. 1165—a sort of nondescript. This was a 7 ft. coupled engine with leading bogie and outside cylinders 16 in. by 24 in., and had been the property of the Stockton and Darlington Railway. It had, together with a sister engine No. 1163, spare engine at York, been rebuilt at Darlington, and was very similar in appearance to the old 1265 class, known as "Ginx's Babies," though it was not quite so large. All the engines mentioned



NO. 901 AFTER THE ACCIDENT NEAR MORPETH, 1877.

they began to exhibit still more striking differences from one another.

Another double framed 6 ft. coupled engine at Scarborough with 17 in. by 22 in. cylinders was No. 162, the only one of its class. This had been completely reconstructed at Gateshead about 1879, with a new solid deep plate frame. It was afterwards rebuilt by Mr. Worsdell, and finished its days well in the present century on the Bradford and Harrogate train service, being almost the last double framed 2–4–0 engine at work on the North Eastern. There were also two 6 ft. 2–4–0 engines with "mixed frames," *i.e.*, they had inside frames to the coupled wheels and outside to the leading wheels. The cylinders of these were also 16 in. by 22 in. One of them, No. 696, was ran exclusively on the Scarborough and Leeds road, and were never to be seen on the coast line from Scarborough to Hull.

York engines also performed a share of the duties between Leeds and Scarborough, and their classes and types were legion. The engines in this link also ran to Normanton and some, but not all of them, had one turn to Harrogate. Nos. 463 and 473, 6 ft. 6 in. coupled, and Nos. 472 and 157, 6 ft. coupled, were of the 25 and 29 classes, except that No. 157 had been rebuilt at Gateshead. Another 6 ft. coupled engine with double frames and 16 in. by 22 in. cylinders was No. 76, an older engine by Messrs. Stephenson in 1853. There were also three 6 ft. 6 in. Hawthorn's with 16 in. by 22 in. cylinders, Nos. 546, 551 and 552 of the 544 to 553 class. These

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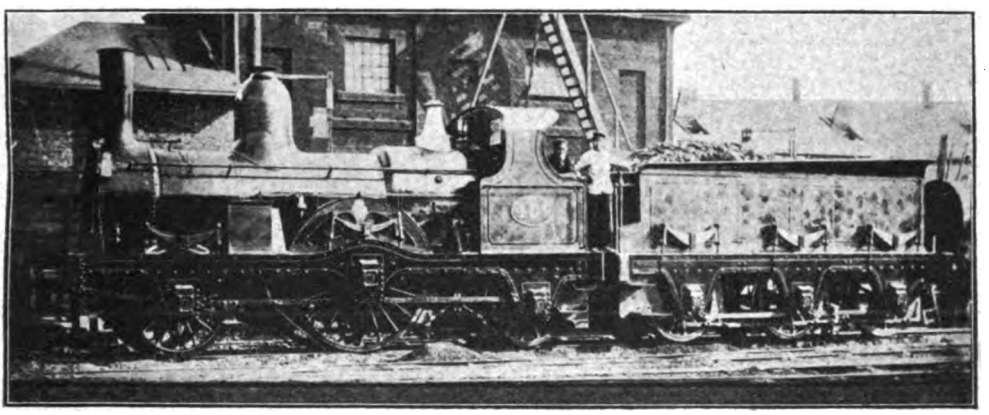
had been the " East Coast " main line express engines for several years from 1865, when they were built, until the 7 ft. coupled Fletchers replaced them. They are illustrated in their original state in " The Locomotives of the North Eastern Railway," by J. S. MacLean. No. 698, a Stephenson similar to the Scarborough engine No. 699, completed the coupled engines in this link, together with the Fletcher 6 ft. coupled Gateshead built engine No. 1441, a smaller edition of the 7 ft. engines, which was regularly employed on the Scarborough expresses.

But York also possessed the greater number of the old single express engines, which were also in the same link. All these had 6 ft. 6 in. driving wheels and double frames, and were mostly very similar in appearance to No. 451 illustrated on this page. Of the Gateshead built engines the oldest, Nos. 66 and 258, had cylinders 16 in. by 20 in., but Nos. 161 and 280, the last to be built in 1862, had 16 in. by 22 in. cylinders. Nos. 220, 224 and 225 by Messrs. Stephenson in 1854 were very similar, but like No. 66 had only a 20 in. stroke. The largest singles, however, were Nos. 447 to 449 by Stephenson & Co., and Nos. 450 to 452 by Messrs. Hawthorn, all built in 1861. These had 16 in. by 22 in. cylinders. The illustration of 451 shows this engine after it had been rebuilt at Gateshead, but the others had completely open splashers, and very tall brass safety valve columns. These were excellent runners, as I can testify from many experiences behind No. 447 (driver Tiplady) and No. 448 (driver Peter Thompson) with loads of about eight and nine six-wheeled coaches. They were usually to be seen on the Leeds and Normanton services, but No. 450 at one time worked a through express from King's Cross to Scarborough, leaving York at 3.30 p.m., which consisted of a number of Great Northern through carriages. On the other hand No. 451 kept to the main line, and for some years worked a fast train from York early in the afternoon for Newcastle.

The engine sheds at York, of which there were two, at the north and the south ends of the station, were certainly, from a locomotive archæological point of view, the most interesting in the kingdom. I have already, in dealing with the Great Western Railway, mentioned the somewhat similar conditions at another cathedral city, Chester, but, deeply interesting though the latter sheds most certainly were, they were not on the same plane as York, which was *facile princeps*. It would be absolutely impossible to give any description of all the varied locomotives stationed there such as would do justice to the subject, for at least 100 different illustrations would be required. Amongst the miscellaneous passenger engines I can only mention three or four which have not been referred to previously. There was one of the last of the " Jenny Linds "—No. 326—which had survived for the reason that it was the only one which had been rebuilt. No. 326 used to " hang round " the yard at the south shed, and was probably employed as a spare engine and on odd trips, but I rarely saw it on a train. This engine had 6 ft. driving wheels and 15 in.



NO. 451. 6 FT. 6 IN. SINGLE ENGINE, 1861.
Cylinders 16 in. by 22 in.

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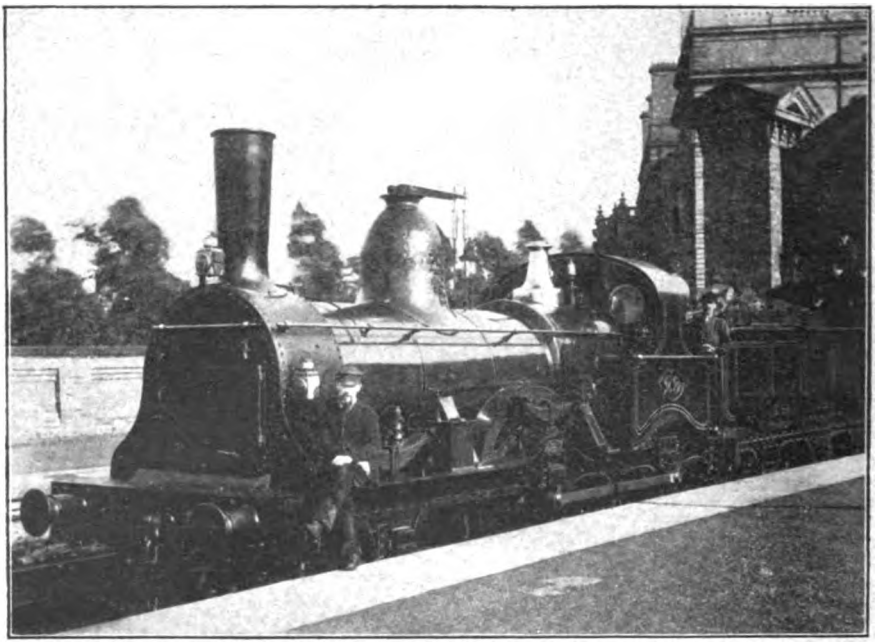
by 20 in. cylinders, and was one of the survivors of the York and North Midland locomotive stock. Another quaint little specimen from the same railway was No. 281, a small 2–4–0 double framed engine which had originated in 1846 at the works of Messrs. Shepherd and Todd of Leeds. No. 281, which had 5 ft. coupled wheels and 14 in. by 20 in. cylinders, being but slightly larger than a potato engine, was considered too small even by the North Eastern locomotive department for regular passenger trains. It was therefore relegated to the break-down vans and stores trains. There were also two curious little 2–4–0 tank engines with double frames which did piloting duties at York station. One of these, No. 14, was adorned with a square saddle tank, and flitted about at the north end, whilst its companion, No. 28, which had to rest content with a back tank only, did similar "piloting" at the south end. These little engines dated from 1839 and 1845 respectively and owed their origin, No. 14 to Tayleur & Co. of Newton-le-Willows, and No. 28 to Messrs. R. & W. Hawthorn. They had 4 ft. 6 in. coupled wheels and 14 in. cylinders. There were some ten somewhat similar engines scattered about the North Eastern system, of which Nos. 58 and 84 worked the Ripon and Masham branch, while No. 684 was sometimes to be seen disconsolately standing outside Selby engine shed. Finally there was No. 252, a diminutive well tank engine with single driving wheels 5 ft. 2 in. diameter, and 10 in. by 18 in. cylinders. No. 252 dated from 1840, having been turned out in that year from the works of Messrs. Stephenson for the York and North Midland Railway. It had a curiously shaped "all-over" cab, very similar in shape to a London "hansom," and was exclusively employed to run the saloon coach used by the engineer, Mr. Copperthwaite. In spite of its diminutive size it must have been very useful for this purpose, for in 1885 it was reboilered at York, when the old tall dome was removed and replaced by a more modern round topped one, with the addition of Ramsbottom safety valves over the firebox.



*Photo]* [*Locomotive Publishing Co., Ltd.*

NO. 29. FLETCHER 2–4–0 PASSENGER ENGINE BUILT AT GATESHEAD, 1868.
Coupled wheels, 6 ft.; cylinders, 16 in. by 22 in.

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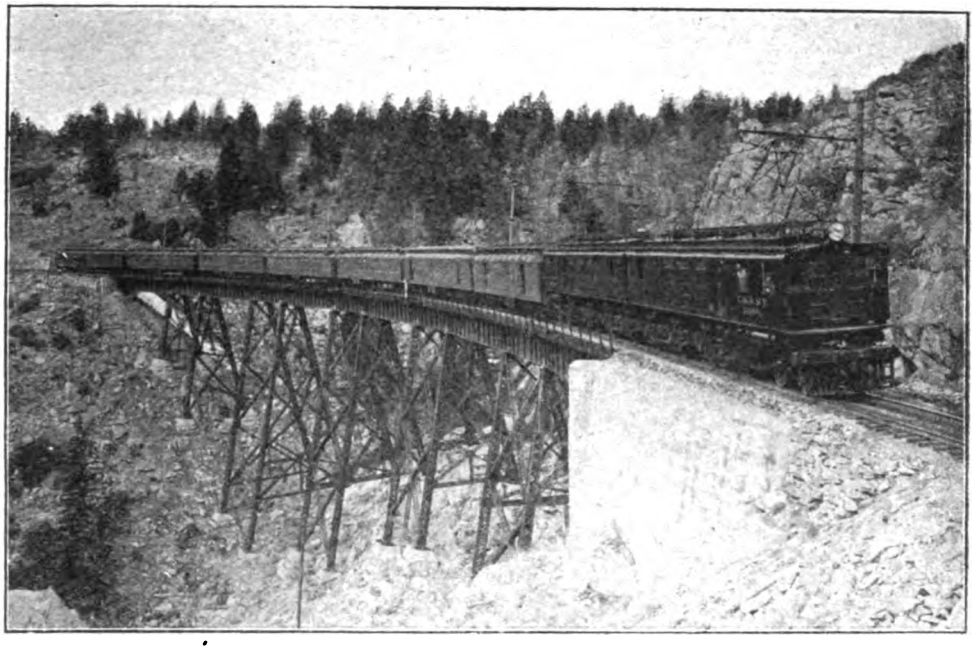

PASSENGER TRAIN NO. 16 DESCENDING GRADE OF ABOUT 1 IN 50 ON EASTERN SLOPE OF THE ROCKY MOUNTAINS, DRAWN BY TWIN ELECTRIC LOCOMOTIVE.

# Railway Electrical Progress and Practice.

## ELECTRIFICATION OF THE MOUNTAIN DIVISION OF THE CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

FOLLOWING the articles describing an imaginary all-electric main-line railway of the future, in which an attempt has been made to forecast probable, but not revolutionary, developments in regard to electric traction on railways of British type, it will be interesting to deal with what is, so far, the most ambitious electrification scheme yet undertaken, that of the mountain divisions of the Chicago, Milwaukee and St. Paul Railway, though it includes conditions and possibilities such as can only be found across the Atlantic.

Four steam locomotive divisions were selected for electrification, aggregating 440 miles in length. Steam traction was first abandoned on the Three Forks-Deer Lodge division, 115 miles long, and crossing the main Continental Divide, thus giving the electrical equipment its initial tryout under the severest service conditions of the entire system. The first electric locomotives were placed in regular service on December 9th, 1915, and during the month of April, 1916, service was extended to Harlowton, making a total of 220 miles of electrically-operated road. By this time it is probable that steam engines have been superseded over the entire distance of 440 miles from Harlowton, Montana, to Avery, Idaho.

In crossing the three mountain ranges included in the electric zone, there are several grades of 1 per cent. or more, the most difficult of which is the 21-mile 2 per cent. grade between Piedmont and Donald, and the longest the 49-mile 1 per cent. grade on the west slope of the Belt Mountains. Curvature is necessarily heavy, the maximum being 10 degrees. There are also numerous tunnels in the electric zone, thirty-six in all, of which the longest is the St. Paul Pass tunnel, over a mile and a half in length, through the ridge of the Bitter Root Mountains.

The Belt Mountains are crossed at an altitude of 5,788 ft. at summit; the main Rockies or the Continental Divide at an altitude of 6,322 ft. at Donald; and the Bitter Root Mountains at an altitude of



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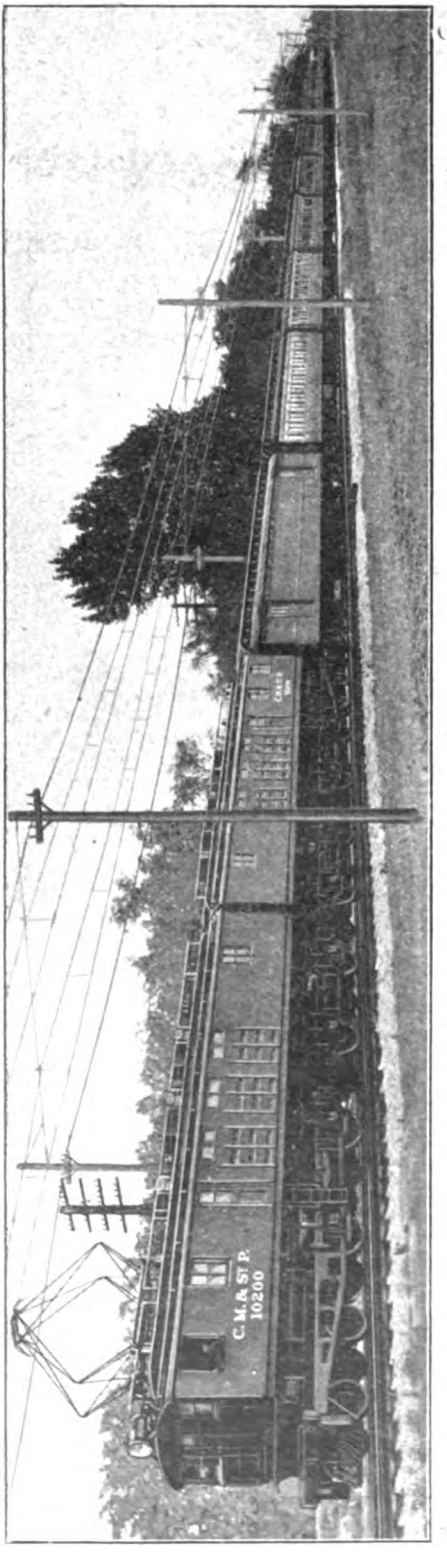


GENERAL VIEW OF PASSENGER TRAIN HAULED BY TWIN ELECTRIC LOCOMOTIVE.

4,163 ft. at East Portal. Pipestone Tunnel, the half-mile bore through the backbone of the continent at Donald, is the highest elevation of the railway.

The passenger service consists of two finely-equipped transcontinental trains in each direction, the "Olympian" and "Columbian," and a local passenger train in each direction daily between Deer Lodge and Harlowton. Freight traffic through the electric zone comprises from four to six trains daily in each direction. Westbound, the tonnage is made up of manufactured products and merchandise for Pacific Coast points and foreign shipment. Eastbound tonnage includes grain, lumber, products of the mines, and some live stock. As a larger part of the traffic is through freight, trains are made up of an assortment of foreign cars, including box and flat cars, and ore hoppers, stock cars, refrigerators, etc., varying in weight from 11 to 25 tons empty, and as high as 70 tons loaded. These cars being owned by many different railway systems, are equipped with air brakes adjusted for different conditions of equipment, thus making the problem of holding the long trains on the heavy down grades by air brakes, a most difficult one.

Electrification promises a material reduction in running time. It has been found, for example, that on the 21-mile 2 per cent. grade from Piedmont to Donald, the electric locomotive can reduce the running time of passenger trains from an hour and five minutes to approximately 40 minutes. On the run from Deer Lodge to Butte, which under the steam locomotive schedule required an hour and twenty minutes, a saving of approximately thirty minutes can be made.

In freight service, it has been found that on the first division where the steam locomotives have required ten to twelve hours to make 115 miles, electric locomotives can meet a schedule of from seven to eight hours for the same distance. The heavy grades and frequent curves at certain points offer serious obstacles to steam locomotive operation even in the summer time, but with winter temperatures and heavy snowfalls in the Bitter Root Mountains, serious delays have occurred, owing to engine failures or to inability to make steam. The capabilities of the electric locomotives are in no way impaired by cold weather or by inability to obtain fuel or water in case of snow blockades. During a series of record-breaking temperatures in December, 1915, Mallet

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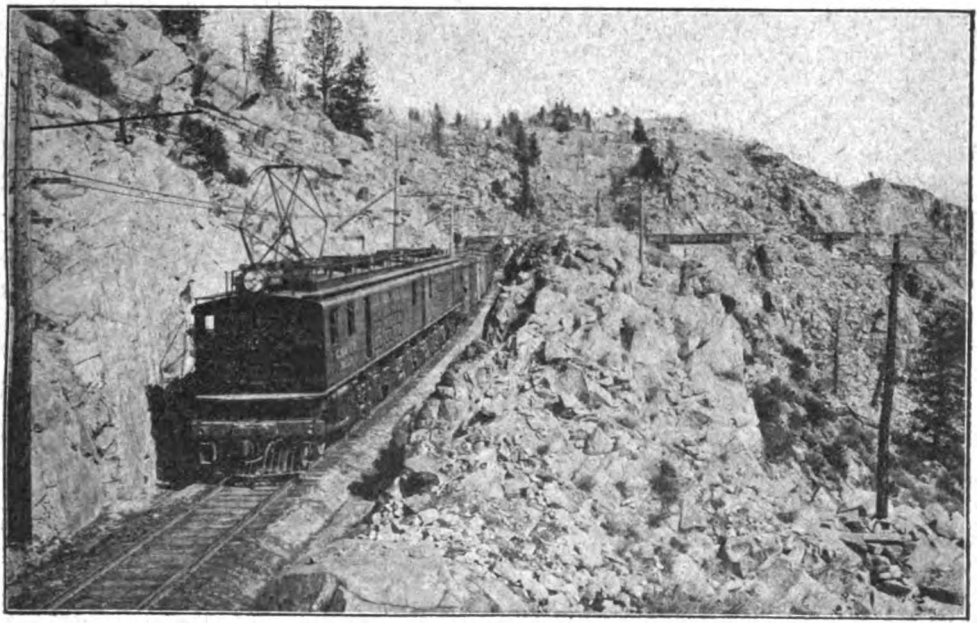
engines were frozen up at different points on the system, and the new electric equipment was rapidly pressed into service to replace them. On several occasions electric locomotives hauled in disabled steam engines and trains which would otherwise have tied up the line.

During initial operation on the Rocky Mountain Division, the capacity of the new locomotives has been thoroughly tested. Trains of 3,000 tons trailing have been hauled east and 2,800 tons west, using a helper on the heavy grades. From the operating data obtained on the first division, it is evident that much heavier trains can be hauled with the electric locomotives than with steam engines, and all passing tracks are being lengthened to take advantage of longer trains. On some of the runs where the grades are less than 1 per cent., trains of as many as 130 cars and as heavy as 4,000 tons have been hauled with a single locomotive.

The four through passenger trains, "Olympian" and "Columbian," are taken across the two mountain ranges by a double-unit passenger locomotive. These trains at present consist of eight vestibuled steel coaches, weighing approximately 650 tons. Instead of changing locomotives at Three Forks, as has been the practice under steam operation, the same locomotive is run through the 220 miles from Deer Lodge to Harlowton, changing crews midway. The local passenger train operating in the electric zone between Deer Lodge and Harlowton is handled by a half unit weighing about 150 tons with equipment similar to the main line locomotives.

Regeneration on the descending grades, by reversing the function of the electric motors, reduces the cost of operation and furnishes a solution of the difficult braking problem. On the long-sustained grades encountered in crossing the three mountain ranges, great skill is required to handle either the heavy and varied freight or the high speed passenger trains with the usual air brakes. With regenerative braking, the motors become generators which absorb the energy of the descending train and convert it into electricity, thus restricting the train to a safe speed down the grade, and at the same time returning electric power to the contact wire. Usual speed of electrically-hauled freight trains is 15 miles per hour ascending and 17 miles per hour descending the maximum grade.

The scheme of electrification includes the generation of current from the several water-power plants of the Montana Power



1,450 TON FREIGHT TRAIN NEAR GRACE, DRAWN BY TWIN ELECTRIC LOCOMOTIVE.



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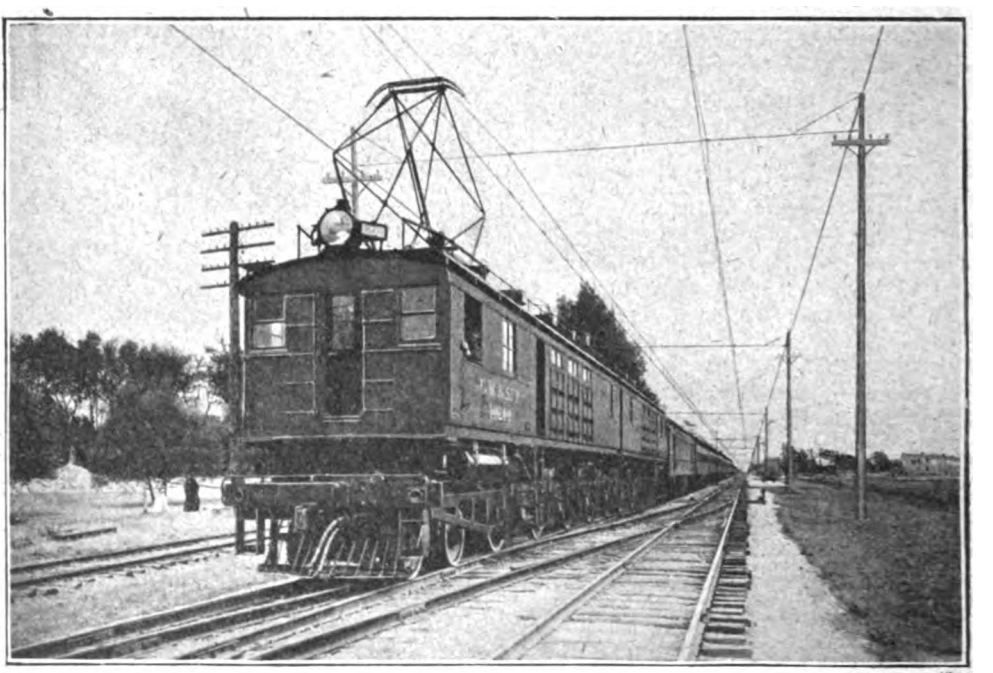
Company; transmission at 100,000 volts, three-phase, 60 cycles; conversion in substations to 3,000 volts direct current, and distribution over catenary overhead construction to electric locomotives.

Main line electric locomotives are constructed in two units permanently coupled together, the halves being duplicates and each capable of independent operation. Each electric locomotive weighs 282 tons, and has a running tractive force of 85,000 lb., or a starting tractive force of 136,000 lb. There are forty-two of these main line locomotives (thirty freight and twelve passenger) and two switching locomotives. The locomotives are the first to be used for railroad service with direct-current motors operating at a potential as high as 3,000 volts, and the first to use direct-current regeneration. (It is of interest to note that this is the first direct-current installation to use a potential as high as 3,000 volts, and this equipment was adopted after a careful investigation of all systems available for electrification. The Butte Anaconda and Pacific Railway, in the immediate vicinity of the Chicago, Milwaukee and St. Paul electrification, has been in operation with 2,400-volt direct-current locomotives since May, 1913, and has furnished an excellent demonstration of the entire practicability of high-voltage direct-current operation.) The passenger locomotives are equipped with a gear ratio permitting the operation of 800 ton trains at speeds of approximately 60 miles per hour on straight level track. The average passenger train weighs from 650 to 700 tons, and is hauled over the 2 per cent. grade without a helper. The freight locomotives are designed to haul a 2,500 ton train at approximately 16 miles per hour on all grades up to and including 1 per cent. On 2 per cent. grades the trailing load is limited to 1,250 tons, although this figure has been exceeded in actual operation.



HEAD-ON VIEW OF ELECTRIC LOCOMOTIVE HAULING PASSENGER TRAIN.

Each locomotive is equipped with eight 1,500-volt motors, insulated for 3,000 volts to ground. Each motor is twin geared to its driving axle, a pinion being mounted on each end of the armature shaft. Additional flexibility is obtained by the use of a spring gear and a spring nose suspension which minimise the effect of all shocks and also reduce gear wear to a minimum. The motor is of the commutating-pole type, and is constructed with longitudinal ventilating ducts in the armature for forced ventilation from a blower in the cab.

Switching locomotives also employed are

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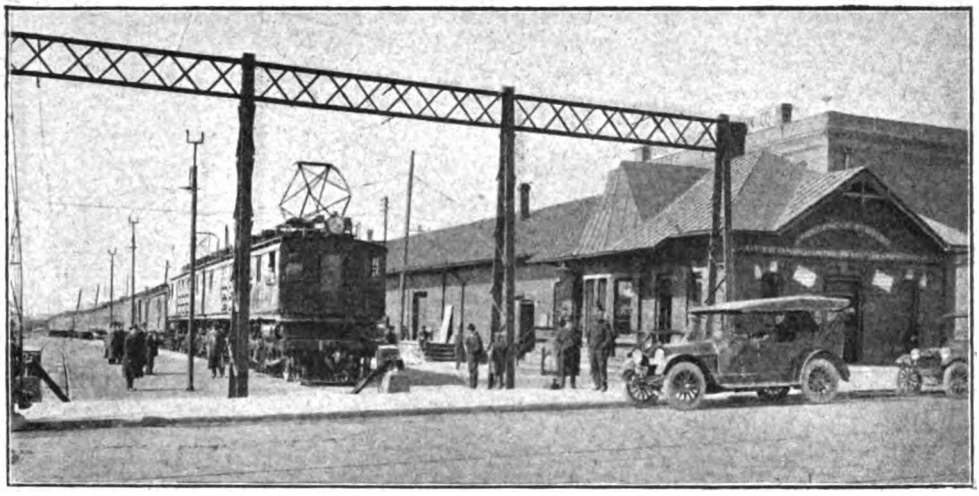
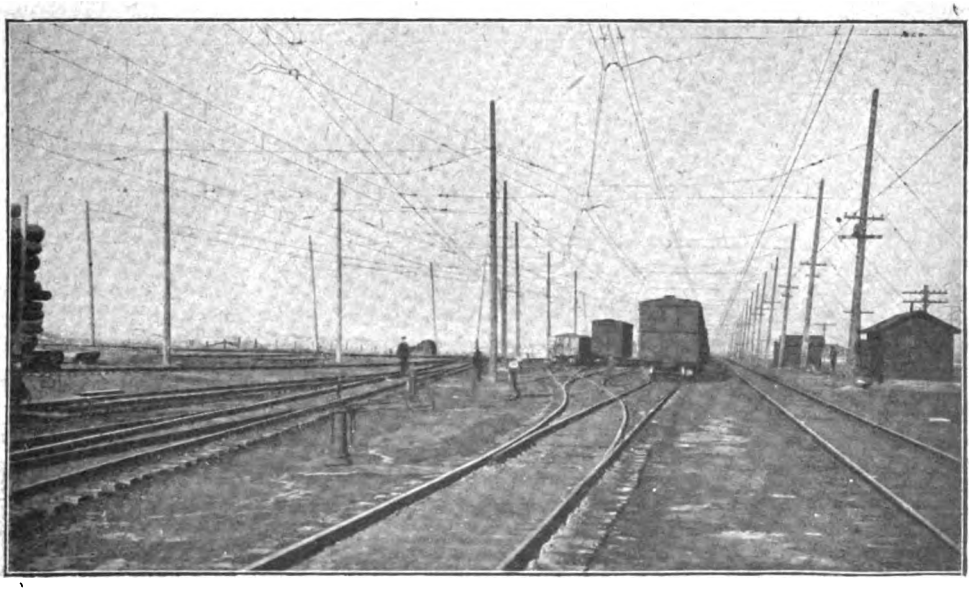


"OLYMPIAN" TRANS-CONTINENTAL PASSENGER TRAIN AT BUTTE STATION, HEADED BY TWIN HIGH-SPEED ELECTRIC LOCOMOTIVE.

of the swivel truck type, weighing 70 tons each, and equipped with four geared motors. A single pantograph similar to that used on the main line locomotives is mounted on the cab and in other ways the locomotives represent standard construction. Many of the details are interchangeable with those used on the main line locomotives.

The Montana Power Company, with whom the contract was closed for electric power, operates a network of transmission lines covering a large part of Montana, which are fed from a main plant at Great Falls, and a number of other widely separated water power plants of varying capacity at all seasons of the year. A notable feature of this pioneer electrification is, therefore, the conservation of fuel consequent upon the utilisation of water power. The Montana Power Company's transmission lines, which are carried in some cases on steel towers and in others on wooden poles, supply the railway system at seven different points. The railway company's transmission line



ELECTRICALLY EQUIPPED YARDS AT BUTTE, MONTANA.

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extends the entire length of the system on wood poles. In most cases this line is built on the Company's right-of-way, although at several points there are cut-offs which make a considerable saving in the length of line. With this completely inter-connected transmission system, each sub-station may be fed from either direction, and also at the tie-in points from a third source of power.

Fourteen sub-stations are equipped for converting the 100,000-volt alternating current to 3,000 volts direct current. They are distributed along the route at average intervals of 32 miles. Each station contains step-down transformers, motor-generator sets, switchboard, and the necessary controlling and switching equipment. The transformers receive the line current at 100,000 volts and supply the synchronous motors at 2,300 volts. Each synchronous motor drives two 1,500-volt direct-current generators connected permanently in series, thus supplying 3,000-volt current for the locomotives. Stations are located at Two Dot, twelve miles west from Harlowton, and continuing west, at Summit, Josephine, Eustis, Piedmont, Janney, Morel, Gold Creek, Ravenna, Primrose, Tarkio, Drexel, East Portal and Stetson. Bungalows have been erected adjoining each of the sub-stations for housing the sub-station employees.

Overhead construction is of the modified flexible catenary type designed by the General Electric Company and installed under the direction of the railway company's engineers. The so-called twin conductor trolley has been installed after careful investigation and experiment. This comprises two wires alternately connected to the steel catenary. This form of construction permits the collection of heavy current through the twin contact of the pantograph with the two trolley wires, and assures sparkless collection under all speeds.

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# NEW SUPERINTENDENT OF THE LINE, LONDON AND SOUTH WESTERN RAILWAY.

THE appointment by the Directors of the London and South Western Railway of Mr. George F. West, to be Superintendent of the Line, in succession to Mr. Henry Holmes, M.V.O., retired, has proved a most popular one, both as far as the travelling public are concerned and amongst the railway staff generally. Mr. West's career from November, 1880, when, at the age of 14, he entered South Western service as a junior clerk at Shepperton, has been one of steady and marked progress, covering every position of responsibility in the Traffic Department, and affording the practical experience which eminently qualifies him to be chief officer of that section. He was transferred to the Traffic Superintendent's Office, Waterloo, in December, 1886, occupying important positions in the Special Trains and Train Running Departments, being placed in charge of the latter in 1893. After three years he was promoted to Chief Clerk in the Office of the Superintendent of the Line. In January, 1897, he was appointed Metropolitan District Superintendent, and five years later (January, 1902) he succeeded Mr. Holmes as Assistant Superintendent of the Line, holding this office until honoured by the present appointment to the premier position, which dates from November 1st. It would be impossible to enumerate all the important events connected with railway working with which Mr. West has been closely identified; sufficient to say that his part in assisting towards the successful dealing with the vast operating problems involved over a period from the Jubilee of 1887 until now should serve him in good stead in the future, into which the good wishes of all his many friends in the railway world and outside will accompany him.

*Photo*] [*Topical.*

MR. GEORGE F. WEST.



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# Rebuilt Superheater-Fitted Main Line Locomotive:

## MIDLAND GREAT WESTERN RAILWAY OF IRELAND.

BY the courtesy of Mr. W. H. Morton, Locomotive, Carriage and Wagon Superintendent of the Midland Great Western Railway of Ireland, our Frontispiece shows one of the rebuilt 4–4–0 main line express engines, No. 124, *Mercuric*, of the "Celtic" class. The principal change is the fitting of superheating apparatus, of which a systematic trial is now being made in view of the heavy loads which both passenger and goods engines have to work over a hard road. These trials also include a smaller 4–4–0 engine, No. 11, *Erin-go-Bragh*, of the "Connemara" class.

As rebuilt No. 124 is fitted with an 18-element superheater, and Detroit Bull's-Eye lubricators. Steam distribution is controlled by Stephenson link motion with rocker arms. Coupled wheels are 6 ft. 3 in. diameter, and bogie wheels 3 ft. 6 in. diameter. Heating surface is as follows: 18 superheater tubes, 5¼ in. diameter by 11 ft. 3¼ in., 254 sq. ft.; 112 flue tubes, 1¾ in. diameter by 11 ft. 3¼ in., 578·5 sq. ft.; firebox, 150 sq. ft.; total heating surface, 982·5 sq. ft.; superheater surface from face of tube plate, 211 sq. ft.; grate area, 20 sq. ft. Boiler pressure is 175 lbs. to the square inch. Cylinders are 19 in. diameter by 26 in. stroke, fitted with piston valves 8 in. diameter.

Other dimensions are: Length over buffers, engine and tender, 54 ft. 6½ in.; rail to centre line of boiler, 8 ft. 9¼ in.; diameter of boiler barrel, 4 ft. 10 in.; length of boiler barrel, 11 ft.; length of firebox, 6 ft. 3 in.; fixed wheelbase, 9 ft. 3 in.; bogie wheelbase, 5 ft. 6 in.; total wheelbase (engine), 22 ft. 6 in.; total wheelbase (engine and tender), 44 ft. 6 in.; capacity of tank, 3,000 gallons.

For the purposes of the trials, Nos. 11 and 124 are working on the four hardest passenger turns between Dublin (Broadstone) and Galway, together with unaltered engines of the "Celtic" class. The most difficult all-the-year-round train is the "Limited Mail" from Broadstone at 7.25 a.m., and the corresponding train leaving Galway at 4.0 p.m.; but the 9.15 a.m. and 4.45 p.m. trains from Dublin are not much easier, and in view of the extensive reductions in train facilities due to the exigencies of the war, principally in consequence of the difficulty of maintaining coal supplies and the high costs of coal freightage from South Wales, extreme loading is now a usual condition both with passenger and goods trains.

The "Limited Mail" train is composed of vehicles specially built for the service, with at least five big eight-wheeled cars, a twelve-wheeled dining car, and several six-wheelers, representing about 300 tons between Dublin and Mullingar, where the Sligo coaches are detached. "These bogie coaches," writes one of our Dublin readers, "are unsurpassed by those of any company in Ireland, and compare favourably with most English lines, the first class being fully equal to any English vehicles, while the thirds, both side and centre corridor, are very good. They are all electrically lighted and well designed in every way. Most of the six-wheeled coaches on the main line trains have also electric light, and communicating centre doors between each compartment in the case of coaches with lavatory accommodation." The non-stop allowance between Broadstone and Mullingar is 76 min., a good run for 50¼ miles, in view of the severe grades, which include in the aggregate several miles of 1 in 100, besides other inclines.

Recently we had the opportunity of going over the shops at Broadstone, where Mr. Morton has between 500 and 600 men regularly employed. For their size, and the work undertaken, they are well equipped, and some good work is done. Time would not permit of our making an extended trip behind one of the superheater engines, but a short run to Mullingar and back may be



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referred to in conjunction with some logs kindly forwarded by Mr. H. W. Lea, of Dublin, his records including both the superheated 4–4–0 engines.

Our outward run was made with No. 127, *Titanic*, an unaltered "Celtic" class engine, on the 4.45 p.m., *ex*-Broadstone, load about 220 tons, with two six-wheelers slipped at Enfield. As this run includes a stop at Clonsilla, it will not compare exactly with those recorded by Mr. Lea, so may be dealt with separately.

Leaving Dublin, there is a long adverse grade for several miles, and 17¾ min. were required to cover the 7 miles to the stop at Clonsilla. Beyond, the work done was better, though grades still continue hard in places. From the Clonsilla start Maynooth was passed in 13¼ min. (7 miles), by which this stop the 24 miles occupied 33 min., so that the 43 miles from the Clonsilla start had been run in 62¼ min.

Returning with the up "Limited Mail," drawn by No. 128, *Majestic*, the 24 miles to pass Enfield from Mullingar occupied 36½ min., and the final run into Broadstone, 39¼ min. (26 miles), the complete run of 50 miles taking exactly the 76 min. allowed.

Mr. Lea's runs are much more remarkable, as time was materially improved upon, and may be given in detail. All relate to up journeys by the "Limited Mail."

Runs Nos. 1 and 4 were in early summer, Nos. 2 and 3 in October, 1916, and the nights being exceptionally dark and wet, made very accurate timing difficult. In run No. 2 *Mercuric* slipped rather badly leaving Mullingar, and took a considerable time to

| | Miles. | 1. 4–4–0 engine, *Majestic*, non-superheater, "Celtic" class. Load: 6 bogies,* 4 six-wheelers. | 2. 4–4–0 engine, No. 124, *Mercuric*, superheater rebuilt "Celtic" class, 6 bogies,* 7 six-wheelers. | 3. Smaller 4–4–0 engine, No. 11, *Erin-go-Bragh*, Robinson superheater rebuilt "Connemara" class, 6 bogies,* 7 six-wheelers. | 4. 4–4–0 engine, *Celtic*. 5 bogies,* 6 six-wheelers. |
|---|---|---|---|---|---|
| | | M. S. | M. S. | M. S. | M. S. |
| Mullingar .. | 0 | 0. 0 | 0. 0 | 0. 0 | 0. 0 |
| Killucan .. | 8½ | 14. 0 | 16. 0 | 16. 0 | 16. 0 |
| Hill of Down .. | 14½ | 20.30 | 22.10 | 23. 0 | 22. 0 |
| Moy Valley .. | 19¾ | 26.30 | 28.30 | 30.30 | 29. 0 |
| Enfield .. .. | 23¾ | 31. 0 | 33. 0 | 36. 0 | 33.30 |
| Ferns Loch .. | 30 | 38. 0 | 39.30 | 44. 0 | 41. 0 |
| Kilcock .. | 31½ | 40. 0 | 41.30 | 47. 0 | 43. 0 |
| Maynooth .. | 35 | 45. 0 | 46.15 | 51.30 | 47.15 |
| Leixlip .. .. | 38¾ | 50. 0 | 50.45 | 57. 0 | 52.30 |
| Lucan .. .. | 41 | 54. 0 | 54. 0 | 60.30 | 56. 0 |
| Clonsilla .. | 43 | 56. 0 | 56. 0 | 63. 0 | 58.15 |
| Blanchardstown | 45½ | 60. 0 | 59.45 | 67. 0 | 62.30 |
| Ashtown .. | 47 | 61.45 | 61.15 | 68.45 | 64.20 |
| Broadstone .. | 50¼ | 66. 0 | 66. 0 | 73.30 | 69. 0 |

* Including 12-wheeled dining car in each case.

time the speed was approaching 60 m.p.h., and Enfield was passed 16 min. later (12 miles); notwithstanding an intermediate difficult section near Kilcock. In the neighbourhood of Moyvalley the route again becomes difficult, and a very steady approach was made to a stop outside Mullingar to detach the Sligo coaches. From Enfield to get up speed, but has done the run on other occasions, it is stated, in 64 min. and under with equal loads. In run No. 3, the smaller engine had exactly the same load as *Mercuric*, the train being crowded on each occasion and the weather conditions almost identical — slight side wind and drizzling rain.

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SISKIYOU SUMMIT, LOOKING NORTH.

# The Route of the "Shasta Limited."

By NORMAN THOMPSON.

"THE road of a thousand wonders" such is the designation applied to the rail route between Portland (Oregon) and California by the Southern Pacific Railway, and considering the wealth of interesting features, both engineering and scenic, that are encountered in traversing this line, some degree of justification can be rightly claimed for the title.

This condition arises from the physical characteristics of the country passed through, necessitating the surmounting of two separate mountain ranges, and the threading of several river valleys. Splendid views of the majestic Mount Shasta, lasting for half-a-day's journey, and also of Mount Lassen, an active cone, are obtainable from the car window, and as a climax, when nearing San Francisco, comes a novel water ride across the straits of Carquinez on board the train.

The "Shasta Limited" on its southbound run originates at Seattle, being worked thence by the Oregon–Washington Railroad and Navigation Company through Tacoma, over the Northern Pacific Railway, to Portland, where at the handsome Union depôt the Southern Pacific Railroad assumes control. Connection may also be made from the east, and the Inland Empire Country centreing on Spokane, along the bank of the beautiful Columbia river.

On leaving the "Rose City," a momentary glimpse of one of the streets, a brilliant vista of illumination, is immediately followed by the crossing of the Willamette river, by a double-deck steel bridge, carrying, at its upper level, a roadway with street car tracks, and below, the railway, with a vertical lift section that permits the passage of the curious type of stern-wheel steamers plying on the Columbia.

After gaining the east shore, the train turns sharply to the right and ascends the prettily wooded valley of the Willamette, past Oregon City, where the falls are utilised to generate electric power; Salem, the State capital; Albany, a county seat; and Eugene, the location of the University of Oregon; the last three being railway centres of some importance.

It is interesting to note that a station called "Niagara" is to be reached over the line of the Corvallis and Eastern Railroad;



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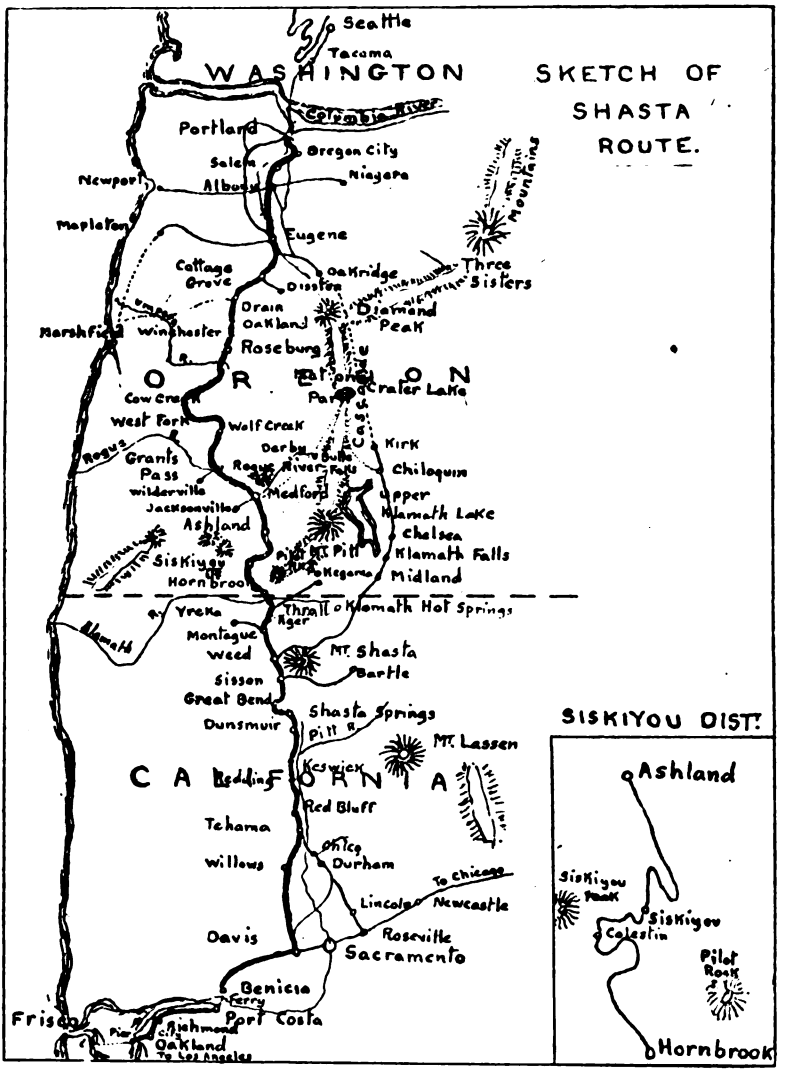
and other railways operating in this neighbourhood include the Salem, Falls City, and Western; Portland, Eugene and Eastern; and Oregon Electric, in addition to various loops and branches of the Southern Pacific Railroad itself, which has recently acquired the two former lines.

now making rapid progress towards completion.

A more direct route to the coast has been projected from the plebeian-named station of "Drain," about 38 miles farther south on the main line.

As the heavy train of twelve cars takes




SKETCH MAP SHOWING THE "SHASTA" ROUTE.

From Eugene, the Willamette Pacific Railroad is open for 69 miles *en route* to the Coos Bay district, which, however, is at present dependent for outside communication on steamship or stage, although possessing its own local railway system. The new link, a Southern Pacific affiliation, is

its course through the darkness, the powerful headlight on the locomotive of the second section, which is pursuing relentlessly behind, becomes visible from time to time on straight portions of the track, and despite the automatic signals with which the Southern Pacific system is equipped, the time-

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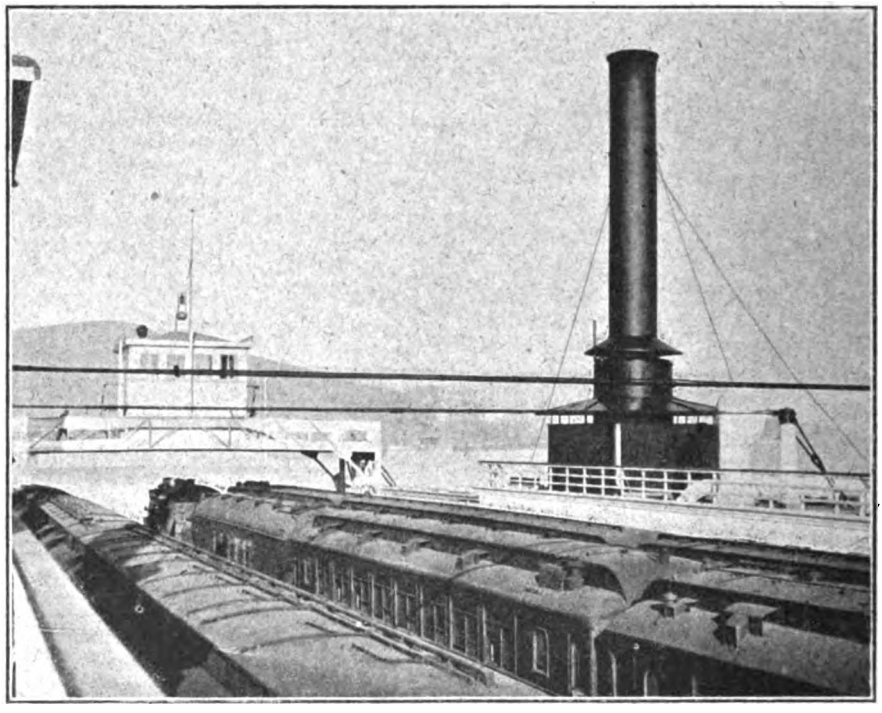
honoured practice of throwing lighted "fusees" on to the permanent way is still indulged in by the brake-man. These burn with a red glow for a definite time interval, and are tossed overboard whenever a reduction of speed is made and frequently when stops occur.

The group of passengers seated on folding chairs disposed about the rear platform of the observation car, has long since melted away in search of the various "sleepers," but the journey continues steadily through the small hours, past Cottage Grove, connecting point for the Oregon, Pacific and Eastern Railroad (formerly called the Oregon and South Eastern Railroad). Diamond Peak and the Three Sisters are located to the east, and the familiarly named station of "Winchester," whose inhabitants number but fifty, is left behind as the sky commences to pale, and the city of Roseburg, on the Umpqua river, is reached, a stop of twenty minutes' duration being made. A new line is under consideration from here to serve the lumber district lying to the left.

The picturesque Cow Creek Canon is next met with, and is followed for a considerable distance, the track forming the first loop at Wolf Creek, six miles beyond a summit of 1,441 ft. On arriving at Grants' Pass a circus is found to be in process of unloading, and all manner of animals of strange appearance are scattered over the metals, together with an interested crowd of sightseers; here also is drawn up train number 14, waiting a clear track to the North.

Grants' Pass is the most convenient centre from which to pay a visit to the caves referred to as the "Marble Halls of Oregon,"



FERRY STEAMER, *Contra Costa*, CARRYING SOUTHERN PACIFIC RAILWAY TRAIN ACROSS THE CARQUINEZ STRAITS.

the California and Oregon Coast Railway also affording communication with Wilderville, ten miles to the West, a service of two daily trains being given.

Getting once more under way, and again ascending, the turbulent Rogue river comes into sight, its course being paralleled past Gold Ray Dam and Table Rock, noted as the scene of the last desperate stand made by the Modoc Indians against the encroachments of civilisation.

Mount Pitt is a prominent landmark in this district, and one noted the wayside

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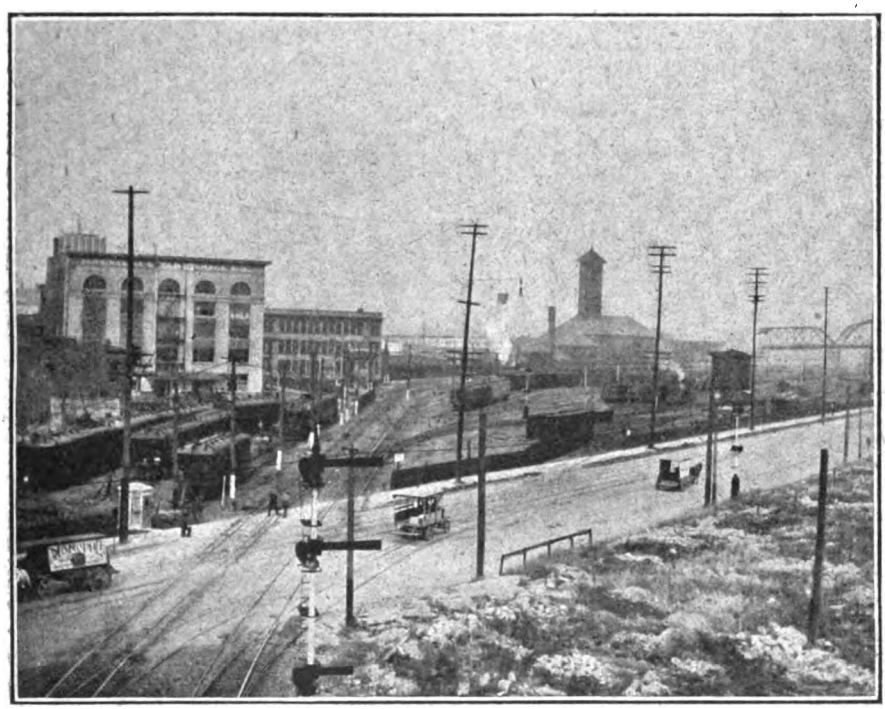
station of "Seven Oaks" in an agricultural region, but the next town of any size is Medford, whence two independent railways diverge, to the east and west respectively. The latter, the Rogue River Valley Company, connects with Jacksonville, six miles distant, both steam trains and gasoline motor cars being employed, making seven or eight trips each way. The Pacific and Eastern Railway furnishes two trains a day to Eagle Point, and three trips per week beyond to Butte Falls, a total distance of 33 miles.

Fifty minutes' run on a still rising grade brings the train to Ashland, where the fruit-growing industry is the mainstay of the city, which, however, also offers advantages as a health resort, with mud, vapour and cold mineral baths. The springs situated in the city park number over 50, and comprise lithia, hot sulphur, sodium, magnesia and iron, white sulphur and cinnabar waters. Hotel accommodation is provided, and facilities for tennis and band concerts help to enliven the visitors. At the station, fruit and cider are a speciality, and here preparations are made for the impending ascent of the Siskiyous. Before leaving Ashland, the following section of the train catches up and pulls in on a parallel track.

Three locomotives are attached at the head on starting, and the long climb to a height of 4,125 ft. above sea level is full of interest. As the summit is neared, the line doubles back on itself through loop tunnels 14 and 15, at a higher level, and a fleeting prospect of the track just passed over can be obtained, with the steam from the engines of the second portion rising amidst the trees; and at this point the southern extremity of the Cascade Range, called Pilot Rock, is discernible.



APPROACH TO PORTLAND UNION DEPT. FROM WILLAMETTE RIVER BRIDGE.
Southern Pacific Railway electric cars may be noted to the left.

Slightly under one hour is the time required to cover the seventeen miles that separate Ashland and Siskiyou stations, but in this distance there is included a vertical rise of no less than 2,235 ft.

A brief halt marks the attainment of the greatest altitude, and as the long string of cars again gathers speed, a "hobo" makes a dive under one of the car bodies in an endeavour to mount a steel stay-rod, but loses his nerve and succeeds in throwing

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himself clear, casting after the retreating train, with its mildly interested passengers, a look of unutterable chagrin.

A tunnel ¾-mile in length is almost at once entered, and a 4 per cent. grade leads down over the border from the "Beaver" State to that of the "Bear." Hornbrook is the southern depôt for the Siskiyou ascent, runs to Klamath Hot Springs, whose water has a temperature of 190 degrees; this resort remaining open the year round, enabling mud baths to be taken at an altitude of 2,700 ft.

Half-an-hour's run finds the train at Montague, and here one of the two locomotives of the Yre-Ka Railroad is standing on

| | | | Southbound. | | | | Northbound. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| September 5th, 1915. | Miles. | Elev. | No. 11. | No. 13. | No. 15. | No. 53. | No. 12. | No. 14. | No. 16. | No. 54. |
| | | | p. m. | p. m. | a. m. | noon. | p. m. | p. m. | a. m. | a. m. |
| Portland, Oregon .. | — | 54 | 3.50 | 8.15 | 1.30 | 12.40 | 1.50 | 10.15 | 7.20 | 8.25 |
| | | | a. m. | | | p. m. | (Read | up from | botto | m.) |
| Roseburg .. .. | 198·4 | 488 | 10.20 | 4.40 | 9.45 | 8.15 | 7.10 | 2.15 | 11.15 | 12.40 |
| „ .. .. | — | — | 10.30 | 5. 0 | 9.55 | 8.30 | 7. 5 | 2. 5 | 11. 0 | 12.30 |
| | | | | | p. m. | | | p. m. | | night. |
| Glendale .. .. | 263·1 | 1441 | — | 7.48 | 1. 4 | 11.30 | — | 11.14 | 8.13 | 9.43 |
| | | | a. m. | | | a. m. | | | | |
| Grants' Pass .. .. | 297·1 | 962 | 2.20 | 9.30 | 2.40 | 1. 0 | 3.20 | 9.30 | 6.30 | 8.10 |
| Ashland .. .. | 341·9 | 1890 | 3.55 | 11.35 | 4.50 | 3. 0 | 1.55 | 7.50 | 4.50 | 6.40 |
| „ .. .. | — | — | 4. 0 | 11.55 | 5.10 | 3.15 | 1.50 | 7.30 | 4.30 | 6.20 |
| | | | | p. m. | | | a. m. | | | |
| Siskiyou .. .. | 358·8 | 4125 | 5. 2 | 1. 0 | 6.20 | 4.16 | 12.50 | 6.24 | 3.24 | 5.10 |
| | | | | | | | night. | | | |
| Hornbrook, Cal. .. | 377·9 | 2153 | 6. 2 | 2.10 | 7.30 | 5.25 | 11.46 | 4.50 | 2. 0 | 3.55 |
| | | | | | | | | | p. m. | |
| Black Butte .. .. | 427·3 | 3905 | — | — | — | — | — | — | — | — |
| Sisson .. .. .. | 434·3 | 3554 | — | 5. 0 | 10.25 | 8. 5 | 9.45 | 2.40 | 11.20 | 1.35 |
| | | | | | | | | | | p. m. |
| Shasta Springs .. | 445·6 | 2550 | 8.37 | 5.38 | 11/ 5 | 8.50 | 9. 8 | — | 10.36 | 12.57 |
| „ „ .. | — | — | 8.42 | 5.48 | —· | 9. 0 | 9. 3 | 1/.57 | 10.26 | 12.47 |
| Dunsmuir .. .. | 448·9 | 2287 | 9. 0 | 6.30 | 11.35 | 9.30 | 8.53 | 1.45 | 10.10 | 12.35 |
| | | | noon. | | a. m. | p. m. | | a. m. | | noon. |
| Red Bluff .. .. | 547·6 | 308 | 12.25 | 11.25 | 4. 5 | 2. 0 | 5. 5 | 9. 5 | 5.20 | 8.10 |
| „ „ .. .. | | | 12.30 | 11.35 | 4.15 | 2.10 | 5. 0 | 8.55 | 5.10 | 8. 0 |
| | | | | | | | | | a. m. | |
| Sacramento (*viâ* Chico) | 682·2 | 30 | — | — | { 9. 5 | — | — | — | { 12.25 | 3.25 |
| | | | | | { 9.20 | | | | { 12.10 | 3.10 |
| | | | p. m. | a. m. | | p. m. | | | night. | |
| Sacramento (*viâ* Davis) | 683·2 | 30 | 4.15 | 9. 0 | — | 7. 0 | 1.15 | 3.25 | — | — |
| | | | p. m. | a. m. | | p. m. | p. m. | p. m. | | |
| Davis (*viâ* Willows) .. | 670·0 | — | { 3.40 | 3.45 | — | { 6.20 | 1.55 | 4.20 | — | — |
| | | | { 3.43 | 3.55 | | { 6.25 | 1.50 | 4.10 | | |
| | | | | | | | p. m. | | | |
| „ (*viâ* Chico) .. | 695·4 | — | — | — | 9.42 | — | — | — | 11.40 | — |
| * { Benicia .. .. | 713·2 | 10 | 4.51 | 5.20 | 10.50 | 7.40 | 12.40 | 2.45 | 10.45 | 1.30 |
| * { Port Costa .. .. | 714·5 | 12 | 5.20 | 5.50 | 11.20 | 8. 0 | 12.15 | 2.20 | 10.15 | 1. 5 |
| | | | | | noon. | | noon. | | | a. m. |
| Oakland Pier .. | 742·1 | 14 | 6.23 | 7. 3 | 12.23 | 9. 3 | 11.25 | 1.27 | 8.50 | 12.10 |
| | | | | | | | a. m. | p. m. | p. m. | night. |

* Mileage given *viâ* Willows. / Flag stop.

No. 13 stops anywhere Tehama to Davis when required to set down from Dunsmuir and North.

No. 15 stops anywhere south of Red Bluff to set down when required from Portland and North, and No. 16 similarly to take up.

Nos. 11 and 12, "Shasta Limited." No. 13, "San Francisco Express." No. 14, "Portland Express." No. 15, "California Express." No. 16, "Oregon Express." No. 53, "Exposition Special." No. 54, "Sound Special."

but although nearly equi-distant with Ashland from the summit, it lies 280 ft. higher, and here a fresh but more gradual climb commences again.

Five miles further is Thrall, whence the Klamath Lake Railroad diverges to Pokegama (24 miles) with an irregular service, and from Ager, the next station, an auto a siding, having the old pattern of smoke-stack pertaining to the wood-burning era. This line, it may be mentioned in passing, possesses only two freight and three passenger cars and is 8 miles in length.

Shortly after four o'clock Edgewood is reached, where an oil-fuel tank with a capacity of 15,000 barrels is a noticeable

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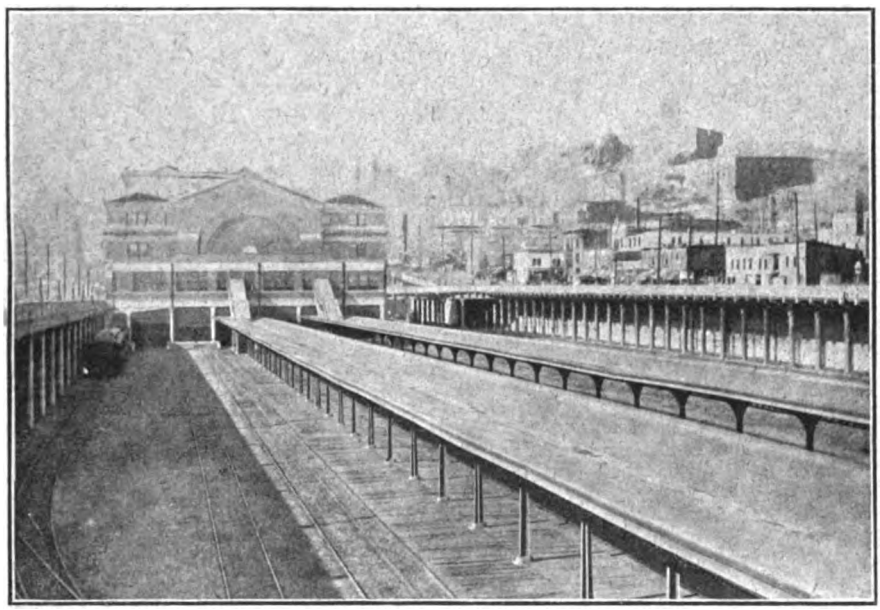
object, and from here a fine view of Mount Shasta is to be enjoyed. Then at the curiously named junction of "Weed" a Southern Pacific branch extends to Klamath Falls, Midland, and Chelsea, giving access to Crater Lake National Park *viâ* Chiloquin and auto stage. Klamath Falls has been called the most hustling commercial city between San Francisco and Portland, and this line is intended to be ultimately extended from its present terminus at Kirk, 127 miles from Weed, to form a loop in conjunction with the Oakbridge branch in the Eugene district of Oregon.

Crater Lake is sometimes described as America's greatest scenic wonder, having been formed by the caving in of the crest of the mountain in the shape of an oval bowl, six miles in length by four miles wide, filled with ice cold water of a deep ultramarine hue, which is always fresh, although no outlet can be discovered. The depth is 2,000 ft., at an elevation of 6,239 ft. above sea level, the lake being rimmed with precipitous rocks. It contains Wizard Island, affording an extraordinary instance of a crater within a crater. Crater Lake Lodge and Tent City, command beautiful prospects of both Crater Lake and Upper Klamath Lake, and may also be reached by auto from Medford.

The crossing of the Sierra Nevada Range next engages attention, the summit in this case being named Black Butte, before arriving at which five distinct cones of Muir's Peak can be seen. Near here is Sisson, at which point the main line approaches most closely to Mount Shasta, which is eleven miles distant, a trail and guides being available for the ascent of 14,380 ft. The stately cone, which is an extinct volcano whose crater measures ¾ of a mile in diameter, can be viewed at closer range with a less expenditure of energy by patronising the McCloud River Railroad, a line mainly interested in the logging industry, but maintaining a regular time schedule for passengers. Two daily trains travel as far as McCloud, and one continues to the terminus, 36 miles from Sisson.



OREGON-WASHINGTON RAILROAD AND NAVIGATION CO.'S DEPÔT AT SEATTLE.

Once more resuming the journey, a remarkable descent into the valley of the Upper Sacramento river follows, and at first it seems incredible that the train can possibly reach the parallel track visible near the foot of the gorge. The "Great Bend," or "Cantara Loop" is the means employed to cope with this difficulty, in negotiating which a complete turn, resembling the letter "U," is made, the engine heading in an exactly opposite direction to that in which the rear cars are travelling.

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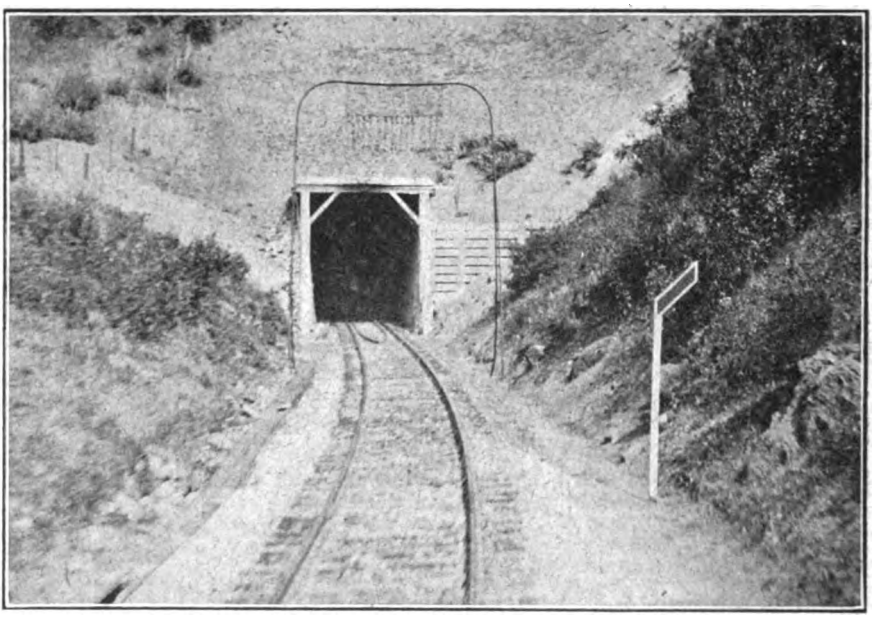
Daylight begins to fail in the lower elevation that has now been attained, but not too soon to admit of appreciating the beautiful Shasta region in passing. Here there have been established hotels, cottages, log cabins and tents for summer residence, Shasta Springs, with the lovely Mossbrae Falls, being the first place of call. These are formed by one of the many streams fed by melting snow from Mount Shasta, which separates into a number of little rills that pour over a tree-clad cliff of semi-circular shape into the Sacramento river 100 ft. below. The scene here is surely unique, the train coming to rest with the cars taking a graceful curve at the base of the hills, the car steps, and some time elapses before the passengers manage to sort themselves into their correct cars by traversing the corridors. From now on stops are frequent, Shasta Retreat, Upper Soda Springs, Dunsmuir, Castle Crag and Sims being noted resorts. Whilst changing engines at Dunsmuir there is an opportunity for inspecting the aquariums of live mountain trout attached to the depôt.

On this section of the route the Sacramento River is crossed eighteen times, and a dozen tunnels are contained in a space of 80 miles; fearsome looking footbridges span the chasm, one such being composed of two single trunks of prodigious length, carrying



SOUTH PORTAL OF THE LONG TUNNEL THROUGH THE SISKIYOU MOUNTAINS.

delightful Shasta Water tumbling down alongside the train and disappearing at one's feet.

The passengers with one accord leave their seats, and the two drinking kiosks are quickly besieged, many also catching the water directly, which can be very conveniently done at a dozen places within a few paces of the cars. As may be imagined, the scene during the all-too-brief wait is most animated, especially as souvenirs must be purchased and picture postcards written and mailed at the station post office by everyone before the ten minutes is up.

The ringing of the bell brings a rush to a light framework and unsupported for a length that appears to be impossible even as one realises its existence.

The Pitt River joins the Sacramento at Delta, and at Pitt station another of the numerous separate organizations that have so often been noted previously on the journey provides a daily train to and from Bully Hill, the mileage in this instance again being only 15 in spite of the somewhat ambitious title of "Sacramento Valley and Eastern Railroad."

A barren spot named Keswick is the junction for the Iron Mountain Railway, and here an old-time method of transport may be

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observed, a horseman leading a pack-horse laden with hay. At Redding, the famous Mount Lassen enters the range of vision, remaining in sight for 25 miles as far as Red Bluff, being 41 miles away at the nearest point. It is the loftiest peak in this portion of the Sierras, having an elevation of 10,577 feet, and no less recently than May, 1915, it broke into activity, causing an appreciable degree of destruction in the immediate neighbourhood, frequent eruptions of rocks and ashes accompanied by volumes of smoke having taken place. Leaving Red Bluff, the junction of Tehama is soon entered, and from here alternative routes are available.

The "Shasta Limited" follows the direct line *viâ* Willows, but two of the through trains make a slight detour through Durham and Lincoln to Sacramento, rejoining the shorter route at Davis. From Chico, on this line, the Butte County Railroad runs to Stirling City. The country as shown by the early morning light is quite flat, with a range of mountains to the North, and there is little of interest to note until arrival at Benicia, where the *Contra Costa* receives the entire train for passage over the water. This boat has superseded the *Solano*, which had the reputation of being the largest ferry-steamer in existence. The train engine takes the first division on to the boat, the other sections being disposed on parallel tracks by switching engines. At Port Costa, the rails on the landing slip have to be carefully adjusted to the level of those on the vessel, but it does not require long to marshal the train for its last short run to the terminal at Oakland Pier, 742 miles from Portland.

Richmond, with its oil tanks, soon denotes the approaching end of the journey, and after calling at the fine new station at 16th Street in Oakland City, the train runs out on a long mole stretching into the bay with a large depôt at its extremity, where passengers and baggage are transferred to an ordinary steam ferry for the final four-mile passage across "Frisco Bay" to the great municipal ferry building in San Francisco.

The route just described constitutes the only rail communication between the cities of the North-West and California, and quite a liberal train service has been in operation this summer, not only to and from Portland and San Francisco, but also extended to reach Tacoma and Seattle on the north, and Los Angeles in Southern California *viâ* the coast line, the throughout mileage amounting to 1,393.

Of the four daily through trains concerned, the "Shasta Limited" is the best-known, being an extra fare service with a number of special features, amongst which may be mentioned a stenographer, barber, ladies' maid, valet and library. The equipment comprises standard Pullman sleeping cars, drawing-room, compartment sleeper, observation and dining cars, all of which serve Seattle, where, as at Portland and Oakland Pier, telephone communication is made during the half-hour preceding departure. This train is slightly quicker when running north, the best throughout speed being 28·34 miles per hour from the start, after leaving the ferry at Benicia to Portland, 713·2 miles.

The other trains running *viâ* Willows are the San Francisco Express and "Exposition Special," southbound and "Portland Express" in the reverse direction, connections being made with Sacramento at Davis. The "California Express" and "Oregon Express," going south and north respectively, and the "Sound Special," travel *viâ* Sacramento, covering an extra distance of 26 miles. All of these carry standard and tourist Pullman sleepers, and reclining-chair and dining cars, observation cars being also attached except in the case of Nos. 15 and 16.

Between Roseburg and Dunsmuir, 251 miles, there are no local trains to supplement the through service, but the "Shasta Limited" is only shown as making 13 stops southbound prior to Benicia, and one more going north. The engines employed in hauling these heavy trains are of various types, the following wheel arrangements all being in use, sometimes two in one train :— 4–6–0, 4–6–2, and 4–8–2.

Within the last four years, the fastest time from Frisco to Portland has been bettered by 20 minutes, a corresponding reduction of 10 minutes having been made in the opposite direction, and the Sacramento connections, *viâ* Davis, have also been improved. The table on page 414 gives a summary of the principal elevations encountered on the route, together with the mileage and timings of the principal trains as shown in the schedule for September, 1915.

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# A Napier Motor Car as a Railway Train.

REFERENCES have been made to the fact that during the present war ordinary road motor cars and lorries have been fitted with railway wheels and run on rails. There have, indeed, been several instances of this being done, and we may instance the car which was used by the Caledonian Railway for traffic across the Connel Ferry bridge, on the Caledonian and Oban section.

We are indebted to Messrs. D. Napier & Son, Ltd., for a remarkable illustration of a Napier car which, in 1904, ran for thousands of miles on American and Canadian Railways. The view shows the owner, Mr. C. J. Glidden, and his wife entering the Canadian Pacific Railway station at Vancouver. The car had to be signalled as a train, and the railway company's conductor in charge for traffic purposes occupies the rear seat with the chauffeur.

For the purposes of this trip special railway wheels, with rims and flanges conforming to North American standards, were sent out from the Napier Works in London.

Mr. Glidden's journey was part of a unique tour of the world by automobile. He started on his remarkable journey on August 27th, 1904, on a Napier automobile with 40 in. steel flanged wheels. The start was made from Minneapolis, to which point Mr. Glidden rode over the ordinary highways on pneumatic tyred wheels. From Minneapolis the run on rails was north of Winnipeg, and from that city west over the Canadian Pacific Railway tracks to Vancouver.

The special wheels for the rails were made in England, and when Mr. Glidden began his tour from Boston to St. Louis the steel wheels were shipped on to the latter city, where they were substituted for the artillery wheels with which the Napier was ordinarily equipped. As the tread of the Napier is the regulation railway gauge, no change in the axles was found necessary.

Three transcontinental railways offered Mr. Glidden the use of their rails for his ride to the Pacific on condition that he followed train orders and carried a conductor so as to comply with the rules. To this he consented. He originally selected a route *viâ* Texas to California, but later changed it to the northern route by way of the Canadian line. West of Winnipeg he crossed the great Canadian prairies and entered the Rocky Mountains by way of Kicking Horse Pass. The total distance of the railway route was upward of two thousand miles.

Besides Mr. Glidden and the railway employés with him, there were on the trip Mrs. Glidden and Charles Thomas, the English chauffeur, who rode with Mr. Glidden in his 17,000 miles of world touring. The Napier was driven only during the day and run off on sidings at nightfall to enable the passengers to rest in hotels, and where possible stops were made "en route" for meals.

An American journalist of the period stated that Mr. Glidden made an "average rate of sixty miles an hour, which is faster than the Transcontinental express." This speed we may accept as an exaggeration, but the car could certainly do 40 or 50 miles per hour when favourable, and no doubt a very creditable average was realised.

It may be mentioned that the whole of the tour contemplated was duly carried out. The journey started from London in 1901—it was never intended as a high-speed "hustle"—and covered the better part of eight years of travel, Mrs. Glidden travelling with her husband throughout. The Napier was transported unpacked on twenty-six steamers. To make the tour of 46,528 miles in 39 countries, the party motored 377 days, twice encircling the Globe, crossing the Arctic Circle in Sweden, and reaching the most southerly road in the world in New Zealand. Changing the wheels to steel rimmed wheels suitable to run upon the rails, the Napier was run from Minneapolis to Vancouver and from Chicago to Mexico over the following railway lines: Soo and Canadian Pacific, 1,803 miles; Rock Island, 3,300; Fort Worth and Denver, 82; International Great Northern, 837; National Lines of Mexico, 753; total, 6,775.

There is hardly need, in the usual way, for ordinary motor cars to be adapted to railway operation, and in most cases it would be preferable to adopt a special design. However, this is a record of an actual achievement, and as such is interesting, besides constituting a notable tribute to Napier workmanship.



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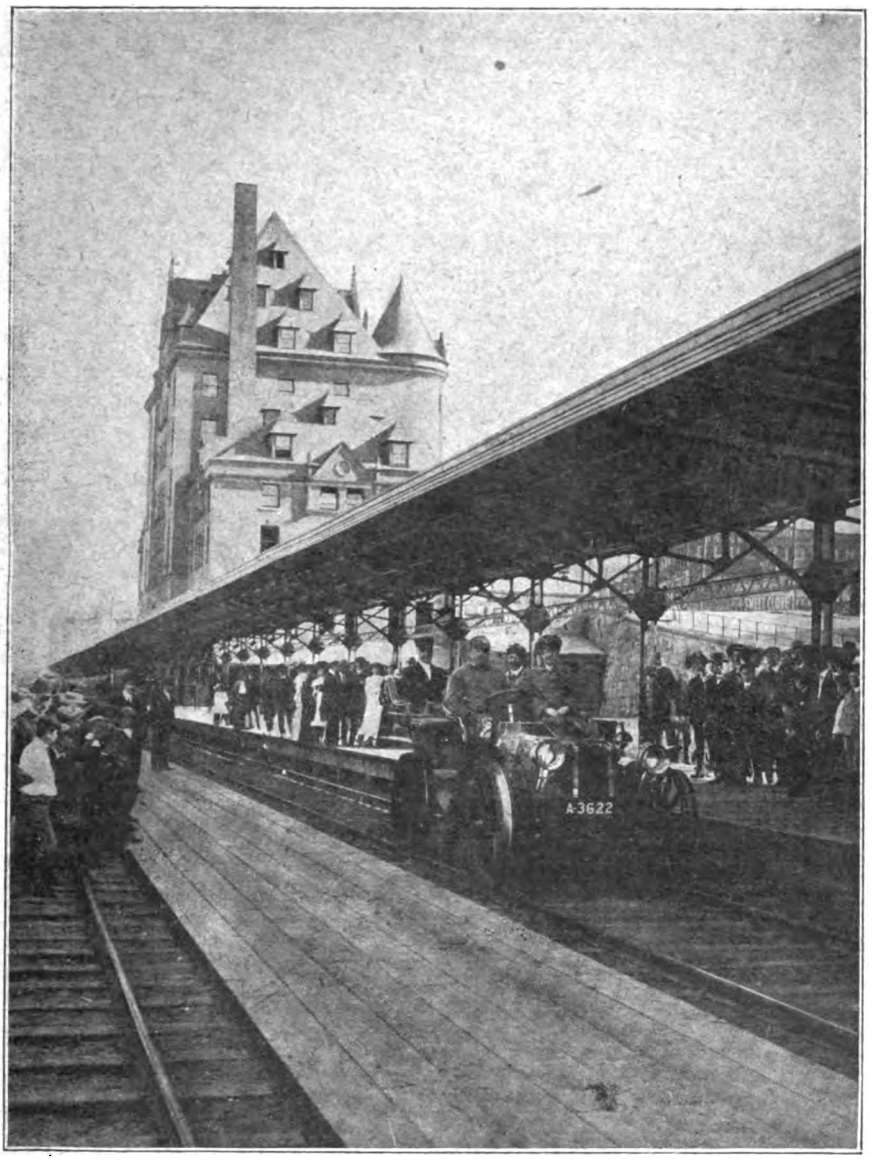
# 6,775 MILES OF RAILWAY TRAVEL BY MOTOR CAR.




**Mr. Glidden's Napier Car entering the Vancouver terminus of the Canadian Pacific Railway.**



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The main problem now is, however, that of effective co-operation between rail and road traction. We have reproduced several illustrations setting forth possibilities which co-operation between road and rail have to offer. Many railways already operate considerable numbers of motor road vehicles, and as the scope becomes further widened, and the conditions of railway traffic become more and more adapted therefor, we shall, no doubt, find Napier and other commercial types of cars in use by railway companies to a far greater extent. There are certain features in railway companies' collection and delivery business which do not favour the use of motor road vehicles. But for parcels and general delivery they have justified themselves, and progress will entail that there shall be more and more adaptation of conditions and methods to permit of the proper utilisation of mechanical traction on roads, in partnership with, and not in opposition to, railway transport.

# Railway Literature.

ECLIPSE OR EMPIRE? By H. B. Gray and Samuel Turner. [Nisbet & Co., Ltd. Price, 2s. net.] This volume is designed to point out how largely the United Kingdom has become dependent upon other nations in regard to industrial progress and development, and has therefore to be placed in the "Wake up, England!" category. But instead of indulging in generalities, the authors have added to their sections—Part I., of eight chapters, deals with the general facts, leading up to careful consideration of the educational problems involved; while Part II. discusses business, industry, the relation of science thereto, the responsibilities of the State, etc., with chapters entitled "Great Britain Unlimited" and "A Vision of Empire"—a Glossary, which constitutes more than half the book, wherein a wide range of subjects is presented by authoritative writers (in some cases signed). The postulate given is "That during the last 20-40 years, most of the inventions, new ideas, and developments, have been given to the world by countries other than our own; furthermore, that their value has been more quickly appreciated and put to practical use in foreign lands." On this basis no fewer than 92 contributions are included, of various lengths, the main divisions being Great Britain's Industrial Inefficiency, General Commercial Subjects, The Press, The Office, General Engineering, Civil Engineering, Mining Engineering, Electrical Engineering, Travel, Benzole and Gas, Textiles, Agriculture, Domestic, Social and The Heating Art. The ground is, therefore, well covered.

The Travel section includes two railway articles. The first, unsigned, deals with the general situation, explaining, too, why there have not been the same opportunities and demands for special and new features as in some other countries. Indeed, the general idea is that while in some respects America and Germany have gone ahead, the United Kingdom does not figure so badly. The second article, on "Locomotive Engineering," is by Mr. J. F. Gairns, Editor of the RAILWAY MAGAZINE, and also suggests that Great Britain has a good deal to its credit. A table of derivations added to the article, presumably by the authors of the book, is, however, somewhat misleading, seeing that although it is apparently intended to epitomise the two articles, it attributes tube railways to America, and interprets certain remarks—as to, for instance, the Belgian derivation of the Walschaert valve gear—on a too wide basis, with the result that it is stated that "cylinders, motion gear and valve gear" are of Belgian origin!! There is also an entirely incorrect statement that tank engine development is due to "America, Great Britain and France." The article describes tank engines as "mainly characteristic of British practice, but a great deal has also been done in Europe." America is not mentioned, and is, indeed, a long way behind in this connection. However, these and similar inconsistencies or misunderstandings are almost inevitable in such a compilation; but the general idea of the work is good, and it is carried out on unconventional lines.

* * *

EFFICIENCY IN FIRST AID. By N. Corbet Fletcher, M.B., M.R.C.S. This little work, published by Bale, Sons & Danielsson, Ltd., at 1s. net, is described as a manual of aids for senior students of first aid. It is supplementary to the author's "Aids to First-Aid," which, within three years of publication, has already reached its third edition. It has been written with the purpose of supplying a requirement which has been created by an ever-advancing efficiency, for senior students of first-aid in their work and examinations.

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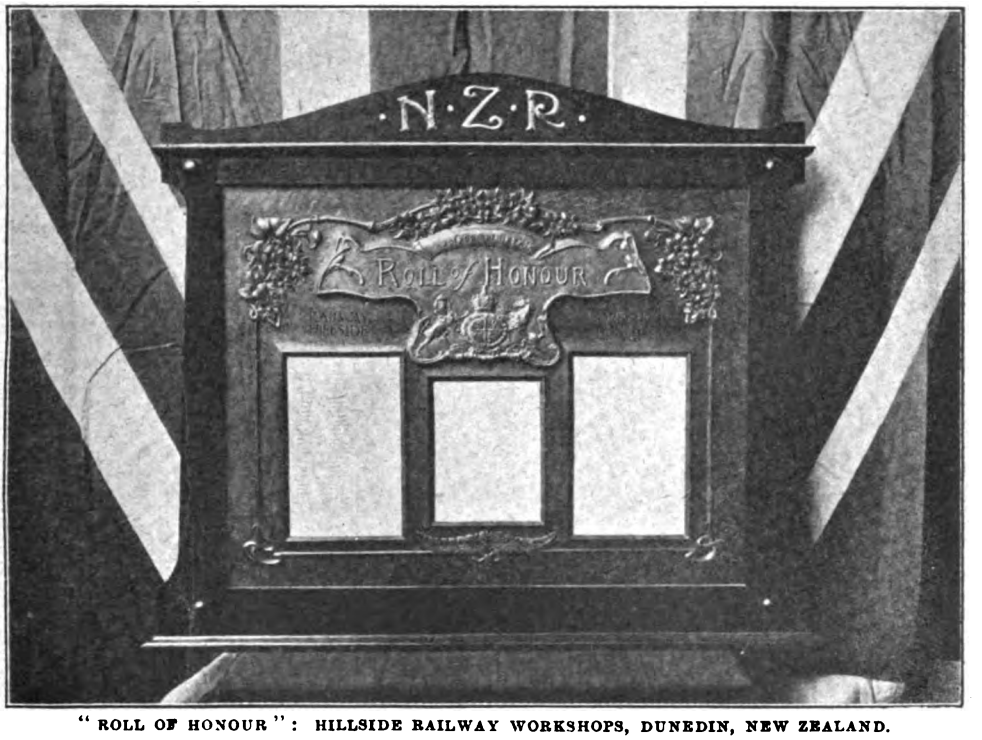
# Overseas Railways and the War.

IT is recorded in the Annual Report issued by the administration of the New Zealand Railways that during the year a considerable number of railway men volunteered for service with the Colours abroad. The total number who had enlisted to March 31st last was 1,728. Fifty-two members had fallen in defence of the Empire up to that date. Up to the time of the report it had not been necessary to place any restriction on enlistment by members, although the reduction in numbers in certain grades was creating a somewhat serious problem. The names of all who answered the Empire's call are included in the roll of honour list appended to the report.

In September last a war impost was made of 1d. in each shilling on ordinary passenger-fares, and 10 per cent. on the rates for parcels and goods traffic (except timber). It is estimated that the revenue from this source up to March 31st amounted to £220,000.

We are indebted to Mr. D. Harris Hastings, for the illustration reproduced above, showing a "Roll of Honour" belonging to the Hillside Railway Workshops, Dunedin, New Zealand. This board, the cost of which was subscribed for by the employés of the shops, was made under the direction of the Library Committee and is hanging on the walls of the Social Hall connected with that Institution. Designed by Mr. R. Hawcridge, Director of the Local School of Art, and in the main executed by his pupils, it is of solid oak and the copper letters N.Z.R. were made and presented by Mr. R. E. Isaac, Dominion Director of Technical Education.




"ROLL OF HONOUR": HILLSIDE RAILWAY WORKSHOPS, DUNEDIN, NEW ZEALAND.

The board was unveiled by Col. Cowie Nicholls, the Officer Commanding the District, in the unavoidable absence of His Worship the Mayor, at a patriotic function. The typewritten sheets will, at the conclusion of the War, be replaced with brass plates with the names engraved thereon. The centre panel is reserved for the names of those who have fallen, there being seven names on it at present. Out of 400 employés over military age, 97 have enlisted and gone to the front, whilst some eight or nine others are waiting to be called up. Of course, included in the 400 there is the usual proportion of unfit men and men over 45 years of age.

A similar report from the New South Wales Railways may also be considered on the same



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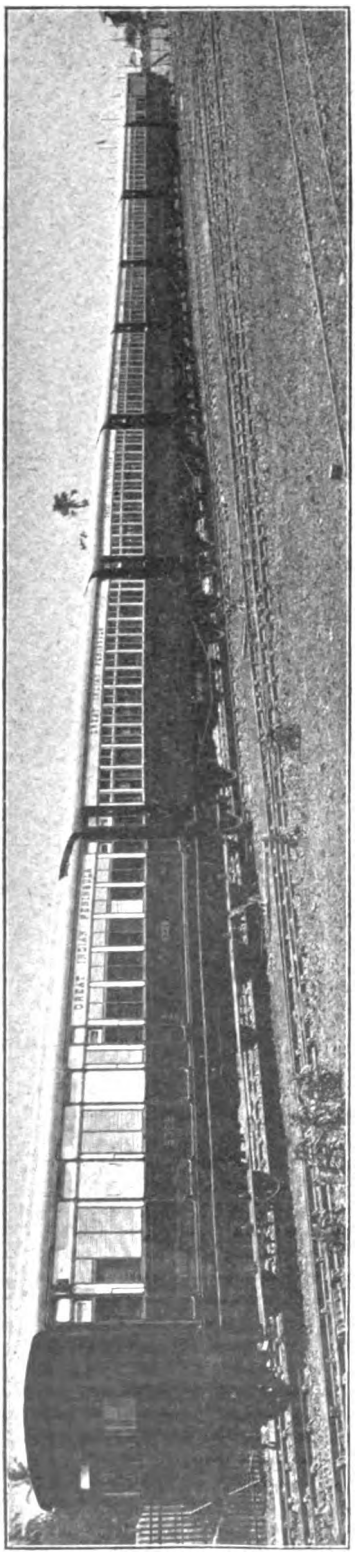
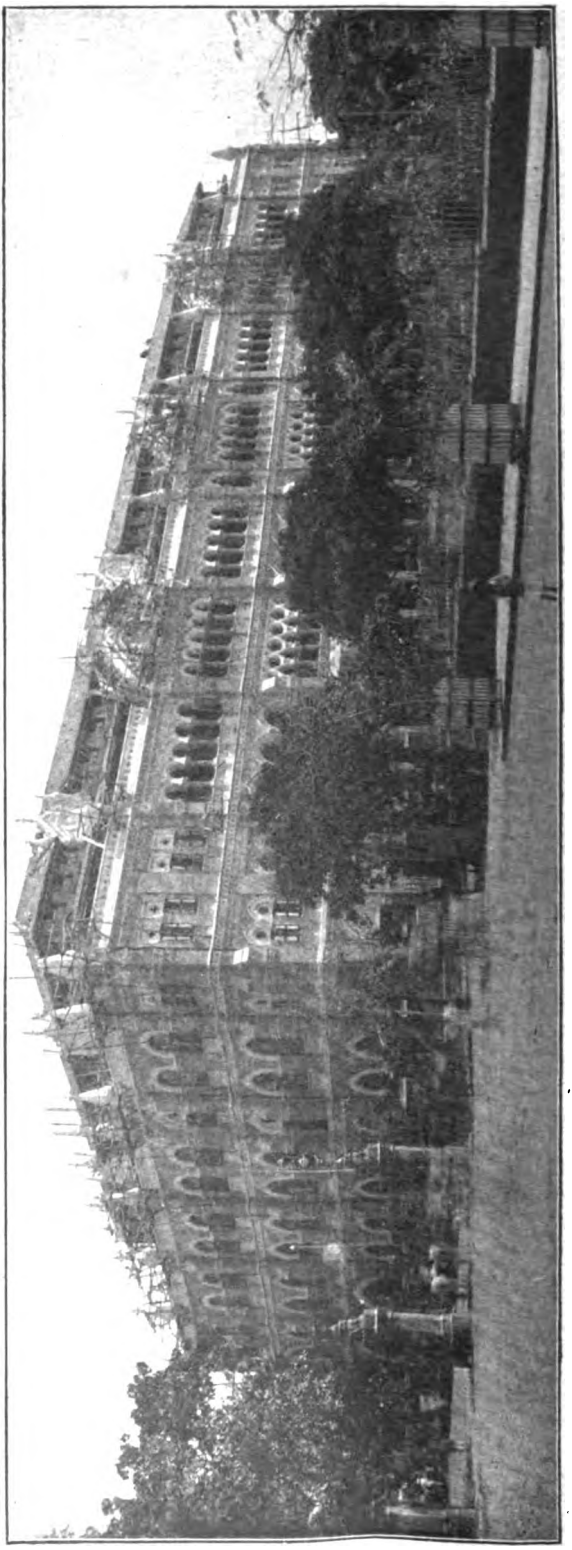


SPECIAL TRAIN FOR MILITARY TRANSPORT, GREAT INDIAN PENINSULA RAILWAY.



ANNEXE TO THE ADMINISTRATIVE OFFICES, VICTORIA TERMINUS, BOMBAY, GREAT INDIAN PENINSULA RAILWAY, NOW USED AS A WAR HOSPITAL.

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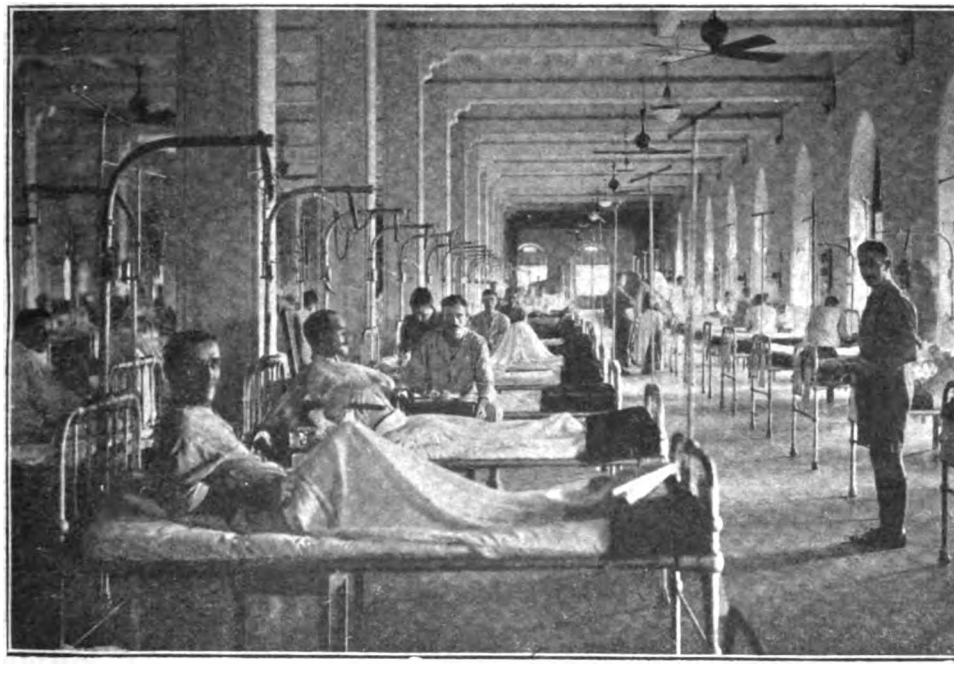
basis. The total staff of the railways and tramways on the books on June 30th numbered 48,588 (of whom 4,914 were serving with the Expeditionary Forces), the average throughout the year being 48,757: Railways, 39,182; tramways, 9,575, as compared with 37,403 and 9,309 respectively, for the previous year, or an increase of 2,045. This increase is stated to be due to the greatly increased number of men who were serving with the Expeditionary Forces, and whose names are being retained on the books of the Department. The value of the concessions and advances made to the whole of the staff, whether engaged on capital or working expenses account, represents a cost at the rate of £615,005 per annum, in which the wages staff will partiicpate to the extent of £513,593 per annum.

19; total, 199; and about 300 others have been wounded.

Provision is made for payment of the difference between the military and departmental rate of pay to all permanent employés, and to temporary employés under certain conditions, who have taken service with the Expeditionary Forces. Where the soldier has left a wife or others dependent upon his earnings the difference in pay is paid fortnightly to such dependents; in cases of single men having no dependents it is allowed to accumulate until their return from active service. The total amount of payments during the year to dependents of employés absent with the Forces amounted to £50,185, while the accumulated sum to the credit of single men without dependents is, approximately,



INTERIOR OF ONE OF THE WARDS, VICTORIA TERMINUS ANNEXE, BOMBAY.

The noble response to the Empire's call by railway and tramway employés recorded in the previous report has been sustained during the year. The enlistments for active service numbered 3,586 (396 salaried officers and 3,190 men on the wages staff), making a total of 5,608 employés who have volunteered and been accepted for service with the Expeditionary Forces up to June 30th, 1916. The number actually serving with the Forces at that date, after allowing for those who have unfortunately been killed in action or died on active service, and others discharged for various reasons, was 4,914 (555 salaried officers and 4,359 employés on the wages staff). The latest information available gives the following list of casualties: Killed in action, died of wounds or illness, 180; missing,

£71,449. A "Roll of Honour," giving the names of the railway and tramway men who have given their lives in defence of the Empire, is appended to the report.

At the Eveleigh and Randwick workshops a large amount of work has been done in the manufacture of munitions, special plant having been provided for the purpose. 18-pounder shell bodies, copper bands and sets of gauges for 18-pounder shells were produced for the New South Wales Munitions' Committee, acting on behalf of the Commonwealth Government, and a considerable quantity of boring machinery for the Australian Mining Corps was manufactured or assembled, tested, and packed for shipment, including petrol-driven electric generating units and sets of special equipment.

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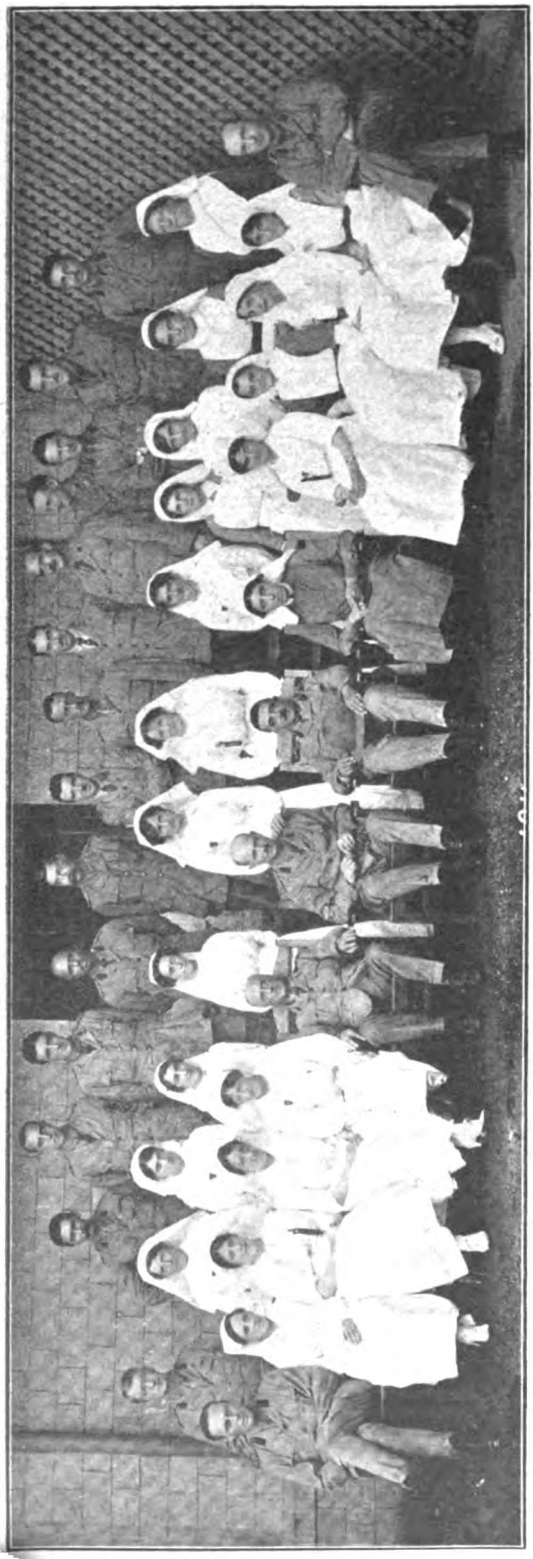

DOCTORS AND NURSES ATTACHED TO THE WAR HOSPITAL, VICTORIA TERMINUS ANNEXE, BOMBAY, GREAT INDIAN PENINSULA RAILWAY.

Although actually a neutral country, there are so many British men engaged there, and so much British influence is concerned, that the contributions made by the Argentine Republic have been very considerable.

Two recent publications by the British Patriotic Committee in the Argentine Republic, and the British Society, indicate the part played by the British Community in the Republic in the Great War. The contributions in men, money and kind have been on a most liberal scale, and in view of the fact that the Central Argentine Railway has played a prominent part in all, a few details concerning the work done may be recorded. Not only have 385 volunteers left their employment with the Company in the Argentine to offer their services to the War Office, but some $20,000 have been contributed to the different funds, apart from the many contributions made direct to various organisations. Then there are gifts of 500 horses from local "estancieros," meat for relief of Belgians in England to the value of $88,000.00, 2 aeroplanes by the British Society, and one from the staff of the railway. Substantial amounts have also been made for other purposes.

In a special issue of an official Argentine publication appear the names of 2,147 volunteers from the Argentine, and particulars of their regiments, a considerable proportion coming from the service of the Central Argentine Railway.

An artistic "Roll of Honour," devoted to servants of the Central Argentine Railway now serving with His Majesty's Forces, has been sent home to England to occupy a prominent position in the London offices of the Company. The name board contains 385 names divided up amongst the different departments the volunteers were employed in before leaving to join the Colours, an asterisk, cross, or other mark against a name showing those who have been killed in action, died of wounds, etc.

The whole of the work was done in the railway workshops at Rosario. The frame measures 10 ft. 3 in. in height by 13 ft. 3½ in. in width. The wood used is a species of the mahogany indigenous to the country. There are three panels containing the names of the volunteers, and flanking the name board are carved rifles of the regulation pattern, to scale in every detail, and near the rifle butts, a couple of bombs.

Over the name board is the title "Roll of Honour" and underneath "Central Argentine Railway" in scroll work of Florentine bronze, with raised lettering. The "Roll of Honour" is surmounted in the centre by a crown and flags intertwined with laurel oak leaves,

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and immediately below are three beautifully carved panels; in the centre, a battle scene, showing one of the latest and largest British guns, on the left a seascape, depicting H.M.S. *Marlborough* at full speed, and on the right, the other important branch of the service, the aerial one, is represented, showing the Central Argentine aeroplane in full flight.

The Directors of the Buenos Ayres Great Southern Railway record that during the year further members of the staff have fallen in their country's cause, and their names, as also the names of those previously mentioned, are printed in italics in a list attached to the report recently issued. The total number of the staff who have come from Argentina to enlist in His Majesty's Forces has increased to 140, and from the London office to 24, making 164 grand total. Of the staff of the Buenos Ayres Western Company 69 have volunteered for actual service, and the report records the death of four of this number. Flight Commander R. G. Gould has been awarded the Military Cross and promoted to the rank of captain for conspicuous gallantry. Since the date of the last report a further 68 employés of the Central Argentine Company have been granted special leave to serve in H.M. Forces, making a total, including London office, of 393. Nineteen have fallen in action or died from wounds, etc., and their names appear in the Roll of Honour printed with the report.

Twenty-four members of the staff in Uruguay of the Central Uruguay Railway of Monte Video, have come home to volunteer for military service. That number represented practically all the Englishmen in the Company's employ of military age. Two members of the Uruguayan staff have been killed, and one reported missing. Seven members of the London office staff have joined.

Special effort on behalf of the war has produced many developments in parts of the Empire other than the United Kingdom, and we have pleasure in referring to the utilisation of the annexe to the administrative offices of the Great Indian Peninsula Railway, at the Victoria Terminus, Bombay, for the purpose of a war hospital. In connection with this work, meetings were held at the administrative offices in Bombay, the outcome of which was the organisation of a fund entitled "The G.I.P. Victoria War Hospital Comforts Fund," with the object of providing cigarettes, flowers, writing materials, games, etc., and giving entertainments to the men in the Victoria War Hospital.

By the courtesy of the Great Indian Peninsula Railway, we are now able to illustrate one of the new military trains recently placed in service. These are intended more particularly for the transport of soldiers, in view of the difficult climatic conditions which prevail in parts of India.

Most of the trains are of the vestibuled corridor type, made up of new military bogie cars, with comfortable corridor and restaurant cars attached for the officers accompanying their regiments. The men's rations are at present (pending construction of proper canteen cars) carried in one of the end vehicles, and are served out *en route* as required. Mineral waters, sufficient to meet requirements, with a plentiful supply of ice and filtered drinking water, are carried at the other end of the train.

**Please send this magazine post free to the troops. It may be handed over the counter at any post office in the United Kingdom without wrapping or address. No postage need be paid. Do it to-day.**

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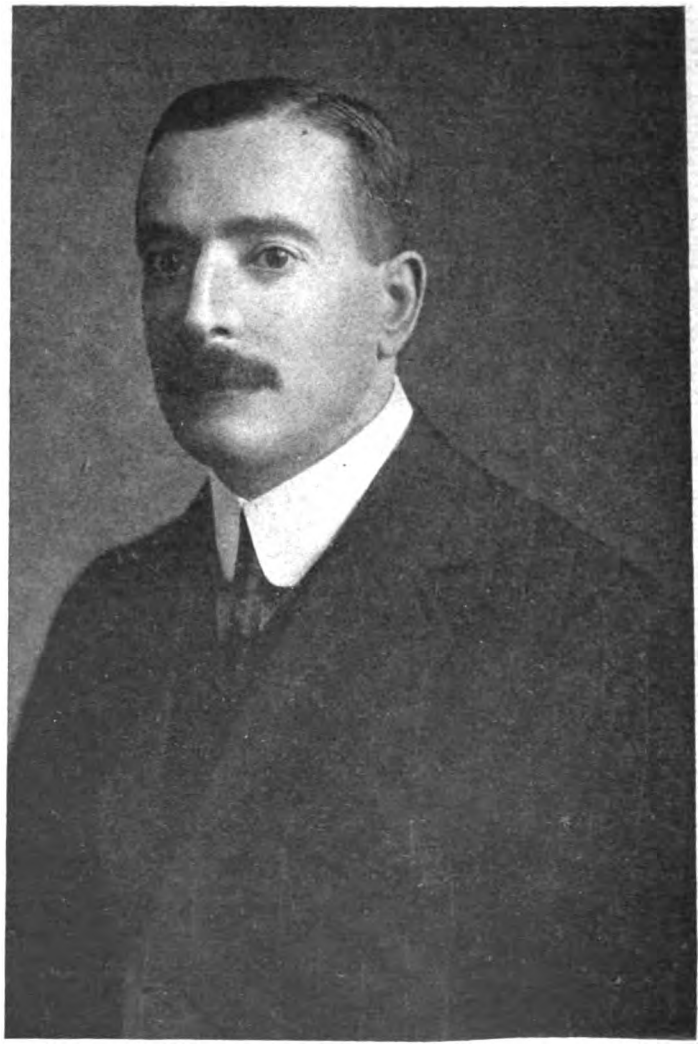

*Photo]* [*Abernethy, Belfast.*

**MR. CHARLES A. MOORE,**

**General Manager, Belfast and County Down Railway.**

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# The Irish Railway Managers' Conference.

## Chairman, 1917:

## MR. C. A. MOORE, GENERAL MANAGER, BELFAST AND COUNTY DOWN RAILWAY.

AS usual, about this time of the year appointments are announced as to the railway officers serving as Chairmen for the ensuing year of the Conferences of the Railway Clearing House. In Ireland the honour now falls to Mr. Charles A. Moore, General Manager Belfast and County Down Railway, who will be Chairman for 1917 of the Irish Railway Managers' Conference.

Mr. Moore joined the service of the Belfast and County Down Railway 31 years ago as a junior clerk in the General Manager's Office. Five years later he was appointed to succeed the late Mr. James Pinion as Traffic Superintendent on his appointment as General Manager. Thirteen and a half years afterwards, or 18½ from entering the service, Mr. Moore was appointed Manager, on Mr. Pinion joining the Cheshire Lines Committee, and some time afterwards was advanced to the position of General Manager.

During the whole of this period the Belfast and County Down Railway has made good progress, and is to-day regarded as one of the most up-to-date systems in Ireland, thus making it possible for the larger companies to treat it, not as a small, but as a rather important undertaking. The position which the railway occupies to-day, brings it in line with those from whom Conference Chairmen may be chosen, and Mr. Moore is to be congratulated on being unanimously elected as Chairman of the Irish Railway Managers' Conference for 1917, and also Chairman of the Irish Board of Management, of the Railway Benevolent Institution for the same period.

During Mr. Moore's connection with the Company, new lines to Ardglass and Castlewellan have been opened, and the line between Belfast and Comber, and Holywood and Bangor, has been doubled, to meet the growing requirements of the business. In addition, a steamboat service has been added, also a rail motor service, as well as a road motor service for both passengers and goods traffic.

This railway has an extremely heavy residential traffic, necessitating good time-keeping with the trains, and it is gratifying to know that this item of revenue continues to grow to such an extent that it is just possible that the Company enjoy at present a larger season ticket traffic than that on any other Irish railway.

On the outbreak of war in August, 1914, large military camps were opened at Clandeboye, Newtownards, Ballykinlar, and Newcastle, in addition to the military barracks at Downpatrick and Holywood, so that the system has been largely used by the military, with satisfactory results.

It will be remembered that Mr. Moore gave very important evidence before the Viceregal Commission on Irish Railways during the sittings 1906 to 1908, and he was also examined before the Royal Commission on the Conciliation Scheme in 1911.



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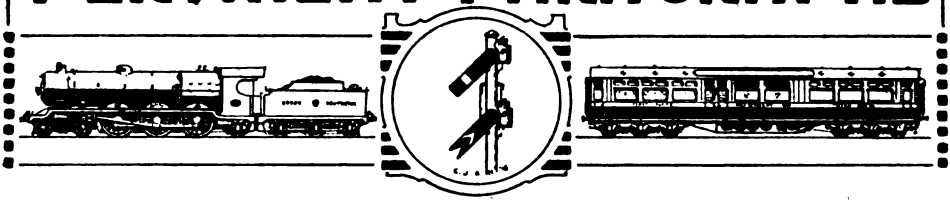
# PERTINENT PARAGRAPHS



## New Appointments on the London and South Western Railway.

MR. HENRY HOLMES, M.V.O., for many years Superintendent of the Line, London and South Western Railway, has retired, and is succeeded by Mr. G. F. P. West, Assistant Superintendent. A portrait and biography of Mr. West is given on another page. Mr. F. Bushrod, Assistant London District Superintendent, has also been appointed Assistant Superintendent of the Line. Mr. D. F. McBright, from the General Manager's Department, has been appointed Assistant London District Superintendent.

Mr. Bushrod, who succeeds Mr. G. F. West as Assistant Superintendent of the Line, was born at Southampton in June, 1875, and entered service at the Docks station in April, 1891. He was removed in August, 1893, to the Assistant Traffic Superintendent's Office, Waterloo, under the late Mr. Charles Bainton, rising to the position of Chief Clerk. Whilst in this Department he particularly specialised in signalling. In January, 1907, he was promoted to Chief Clerk in the Main Line District Superintendent's Office. Two years later he was transferred to the Superintendent of the Line's Office, and on January 1st, 1911, was appointed Chief Clerk. In January of the present year he succeeded the late Mr. F. G. Norris as Assistant London District Superintendent, and on November 1st was appointed Assistant Superintendent of the Line, thus having, by dint of perseverance, and utilising his exceptional abilities to the fullest extent, risen to occupy the highest position in the very office where he started as a lad 23 years before.

Mr. David S. McBright, A.C.I.S., who has been appointed Assistant London District Superintendent, in succession to Mr. Bushrod, entered the service as a junior clerk in 1890, and has for the greater part of his railway career been connected with the General Manager's Office. He was in charge of the Statistical section, also Secretary to the Traffic Officers' Conference, "Train Accidents" Committee, and "Electrification" Committee, the last mentioned dealing with all matters appertaining to the electrification of the Suburban Lines. Since the outbreak of war, he has been acting as Secretary of a Sub-Committee in connection with the work of the Railway Executive. Having already temporarily undertaken the duties of Assistant District Superintendent, he is no stranger to the position now occupied.

## Mr. Holmes' Record of Service.

MR. HENRY HOLMES, M.V.O., has for a long period figured prominently in the traffic working of the London and South Western Railway. He was born at Totton, near Southampton. His connection with the London and South Western Railway dates from 1877, when he entered the service as junior clerk, in which capacity he served at such widely distant stations as Lapford, Winchfield, Moreton, and Micheldever. In 1882 he was made relief clerk, and then relieving stationmaster. Later, Mr. Holmes was attached to the headquarters staff as head of one of the sub-departments which constitute the office of the Superintendent of the Line, and in 1897 he was raised to the position of Chief Clerk in that office, a post he held until he became Assistant Superintendent in 1899. In December, 1901, he was appointed Superintendent of the Line in place of Sir (then Mr.) Sam Fay. The years during which Mr. Holmes has presided over the fortunes of the traffic department of the London and South Western Railway have been a period of steady, but continuous, progress. Additions to the mileage of the railway during the same period include the Exmouth and Budleigh Salterton line, the Meon Valley line, the Lyme Regis branch, the Bordon branch, the Amesbury line, and its subsequent extension to Bulford Camp. Various widenings that have come into operation during the same period consist of the main line between Waterloo and Clapham Junction, Esher and Woking, Woking and Basingstoke, Allbrook Junction and Eastleigh, and St. Denys and Northam, as well as the doubling of the Exmouth branch line as between Exeter and Topsham. Other improvements comprise the reconstruction of Clapham Junction, Basingstoke, Salisbury, Yeovil Junction and Portsmouth Town stations, and the partial reconstruction of the terminus at Waterloo. Rail and road motor services have also been introduced at different places on the system, the number of dining-car trains run daily has increased from four to twenty-four, whilst the working of the heavy traffic to and from the suburban racecourses situated on the London and South Western Railway has, under Mr. Holmes' supervision, been brought to a pitch of perfection never known before. More recently the traffic side of the electrification scheme, of which the first stage is now in regular operation, has come under his direction, while the alterations and improvements at Waterloo have also added to his responsibilities. Mr. Holmes has been the



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recipient of several valuable gifts from Royal personages who have travelled under his charge, and at the conclusion of the Boer War he, in conjunction with Sir Charles Owens, was specially mentioned in the communication which the War Department addressed to the Company acknowledging the services rendered by the staff of the London and South Western Railway in connection with the despatch and return of the troops to and from the seat of war. For the year 1910 he was Chairman of the Railway Clearing House Superintendent's Conference.

### North Eastern Railway Locomotives.

MR. E. L. AHRONS' series of articles continue to attract attention. One reader points out that Fletcher engines described last month are still in service on the North Eastern Railway in the Newcastle district, instancing Nos. 904, 912, 53, 19 and 75.

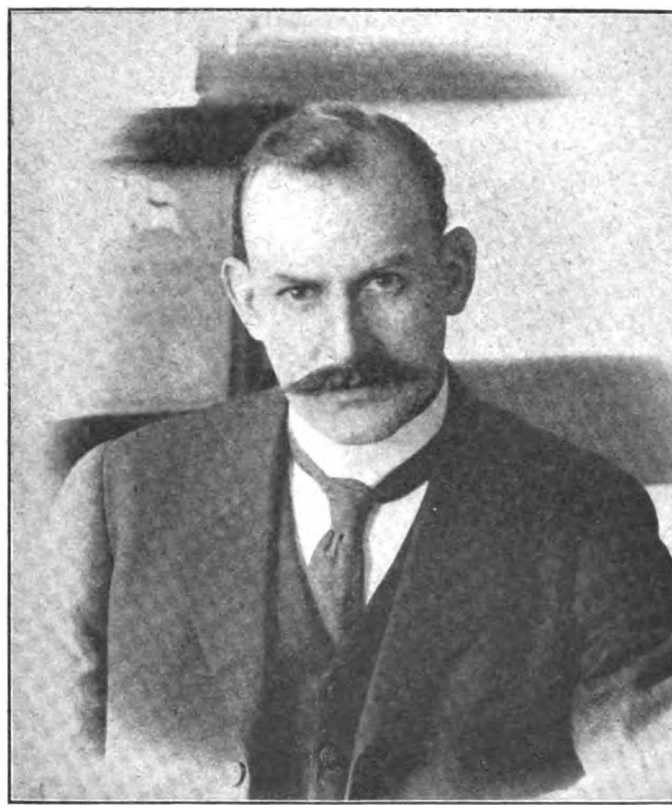
Mr. H. H. Meik, our well-known contributor, remarks: "I notice that Mr. Ahrons states that 'Mr. Thomas Bouch, who was chief engineer of the Stockton and Darlington Railway section until 1875.' This is evidently a clerical error, as Thomas Bouch, afterwards Sir Thomas Bouch, was a civil engineer in Edinburgh and designer of the first Tay Bridge. It was his brother, William Bouch, who was engineer to the Stockton and Darlington Railway, with headquarters at Shildon."

Mr. Ahrons replies that he had overlooked the fact that there were two brothers; hence the error.

### Dining Cars in War-Time.

A LONG-STANDING reader writes in reference to an aspect of the use of restaurant cars by through passengers which appears to require attention, though we do not consider that the evil is so widespread as it might appear. He was travelling from London to Manchester by the Midland route, and found to his surprise, as he expresses it, that he was allowed to remain in the restaurant car for the whole journey. But seeing that, after lunch, he was crowding other passengers, he naturally exchanged his seat for another. Returning to London, however, "I had no reserved seat in the car; but others had, and had reserved them all. There they sat *for the whole journey*, no one else being able to get a meal."

That this is possible as the outcome of the use of restaurant cars in the free manner usual on the Midland, together with other lines—Great Northern Railway, Great Central Railway, etc., including even the London and North Western



*Photo]* [*Topical.*

MR. F. BUSHROD.
Assistant Superintendent of the Line, London and South Western Railway.

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Railway for certain services—is obvious; but we have always found that the bulk of the passengers are quite prepared to exchange seats to enable others to be served, if the matter is pointed out to them. As far, however, as our friend's remarks are justified, we quite agree that the matter is one which calls for ventilation, and in regard thereto we may quote from a reply received from Mr. Arthur Towle, Manager of the Hotels, Refreshment Room and Restaurant Car Department of the Midland Railway:—"The number of cases where passengers have refused to get up to allow someone else who wants a meal to partake of one, is so small, as I hope, to be almost negligible."

### Egg and Poultry Demonstration Train: Great Eastern Railway.

So popular has this train, described last month, proved that arrangements were made, commencing Friday, November 3rd, for the egg and poultry demonstration train, which has been on view throughout Norfolk and Suffolk, to be exhibited at certain other stations, including towns in Essex and Cambridgeshire. Towns concerned in the extension scheme are: Kelvedon, Cambridge, St. Ives, Saffron Walden, March, Ely, Hunstanton, Wisbech, Wickford, Maldon, Saxmundham, Braintree, Liverpool Street, and Bishop's Stortford. The demonstration cars stand at the respective stations, with the exception of Liverpool Street, and are open to visitors from 10 a.m. to 12 noon, and from 1 p.m. to 6 p.m. At Liverpool Street, on November 17th the train was open for inspection at No. 1 platform from 10 a.m. to 4 p.m., when a large and appreciative attendance was recorded.

MR. CHARLES CRUMP.
London Divisional Locomotive Superintendent, Great Western Railway.

### New Appointments on the Great Western Railway.

MR. CHARLES CRUMP has been appointed London Divisional Locomotive Superintendent Great Western Railway, in succession to Mr. John Armstrong, whose retirement was announced last month. Mr. Crump entered the Locomotive and Carriage Department works at Wolverhampton on July 16th, 1884. After serving an apprenticeship to engine fitting and turning, he was transferred to the drawing office, where he remained until 1891, when he left to take up an appointment in Spain. Two years later he returned and re-entered the Wolverhampton works. In May, 1894, he was appointed assistant foreman of the Wolverhampton running shed, and subsequently went back to the drawing office as chief draughtsman. In January, 1903, he was given the additional post of Assistant Superintendent, and two years afterwards was transferred to Swindon as Assistant Manager of the locomotive works. Since January, 1913, until his present appointment, Mr. Crump occupied the position of Assistant to Mr. Armstrong, whom he succeeds. We are indebted to the *Great Western Railway Magazine* for portrait reproduced.

Mr. Robert Arthur George Hannington has been selected to fill the position of Assistant Locomotive Superintendent, vacated by Mr. Crump. Mr. Hannington commenced a pupilage in the Locomotive and Carriage Department works at Swindon, on October 2nd, 1903; he passed through most of the shops, and finished his pupilage in the testing house, laboratory and drawing office. On April 30th, 1909, he was appointed to the position of Assistant Locomotive Superintendent of the Swindon Division, where he remained until his recent transfer to Paddington.

### "War Seals" and the London and North Western Railway.

THAT the London and North Western Railway should have associated itself with the War Seal movement is only in accordance with its policy of always being in the forefront in enterprise associated with benevolent effort. The contribution in "man power" to the war by this railway already exceeds 20,000, and recognising that many of the employés nobly fighting for their country may return maimed and broken, it has been decided to give the War Seal Foundation (founded by Mr. Oswald Stoll) its cordial support. This organisation, it will be remembered, was founded to provide, at small rentals, dwellings answering the requirements of permanent invalids, for British sailors, soldiers, and airmen disabled through the present war, by means of the sale of War Seals to the public.

These War Seals (twenty-four for 1s.) are now obtainable practically everywhere on the London and North Western Railway system, and the proceeds of the sale of these will be devoted to the provision of flats in different centres specially earmarked for the use of London and North Western employés disabled through the war. The War Seals can also be obtained direct from the publicity department, Euston station, by sending 1s. 1d. in postage stamps.

These seals can be used for sealing letters, etc.,

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thereby directing attention to the scheme, besides aiding the provision of funds for the erection of specially designed dwellings in appropriate centres wherein our disabled sailors and soldiers may live comfortably with their families upon their pensions, their medical and physical needs being also met on the spot without any appeal to charity.

Under the ægis of the London and North Western Railway the scheme should go ahead to an even greater extent than it has in regard to the general public. To all railwaymen and to all interested in railways we appeal for active support. In this connection we may pass on the advice: (1) Always seal your letters with a ½d. "War Seal"; (2) put a "War Seal" upon every postcard and parcel you send; (3) put a "War Seal" upon every receipt you give; and in other ways do all that is possible to help on the movement. If each letter passed through the post office in a year were sealed with a ½d. "War Seal," over £7,000,000 would be raised in that period. There are hundreds of other ways, too, in which they can be used.

The seals are issued in the form of adhesive stamps, in the centre a replica of a red seal, bearing the words "Disabled Service, 1914–15," on a khaki ground lettered "War Seal ½d."

## The Mansfield Railway.

THIS line, which was opened for goods traffic on September 4th, and is expected to be brought into use for passenger service very shortly, will form a most important link in the facilities afforded by the Great Central Railway, by whom the new railway will be worked. The undertaking was dealt with at length in the RAILWAY MAGAZINE for September, 1915, at which date part of the line was already in partial use, and work well advanced on other sections. At the recent half-yearly general meeting of the Company, the Chairman, Mr. J. P. Houfton, stated that a substantial volume of traffic is now passing throughout the whole length of the railway, and the passenger stations at Mansfield, Sutton and Kirkby are practically finished. Signalling arrangements, including track circuiting, are well advanced, and the railway will be ready for passenger traffic early in the ensuing year. Progress of the works on the Rufford branch and concentration sidings has been somewhat slow owing to the difficulty in obtaining materials, and also the difficulty of securing labour. The Clipstone Colliery branch is now practically completed, the works having been expedited in consequence of special representations which had been made to the Board.

## Women Workers on the Great Central Railway.

IN a series of articles by Lady Doughty, which appeared in *The Grimsby Telegraph* on "Woman at Work," interesting particulars are given of women workers on the Great Central Railway, and a few quotations may be made. We are indebted to the editor of *The Great Central Railway Journal* for the illustrations reproduced.

"Now, every department of the great railway Company has its various staff of girl-clerks. A few of the leading officers remain to control the departments, but so smoothly have the great changes been carried out, so automatically has the revolution been wrought, that the public have known no inconvenience, no harassing delays, none of the *contretemps* that might have been expected with such innovations upsetting the established order of things."

"The first office shows us a typical business-house scene. High desks, high-legged stools, long tables, plain chairs, an orderly array of account books, files of bills of lading, bills of discharge, etc., and sitting at work or standing at the desks, a staff of girls. There are men—but very few. There is silence here. The work of 'abstracting' summarising accounts, 'claims,' inaccuracies, and correspondence, and 'tracing' allows no time for gossip. It means concentration. It exacts rigid attention. The clerk knows that. More, she is too interested to be distracted by anything else. And here is a trait or characteristic that you meet in every department of the Great Central offices."

"There is another department similar in setting to the first—all high-legged stools, desks, tables, a litter of papers, documents, accounts,

*Photo*] [*Topical.*

MR. D. F. MCBRIGHT.

Assistant London District Superintendent, London and South Western Railway.

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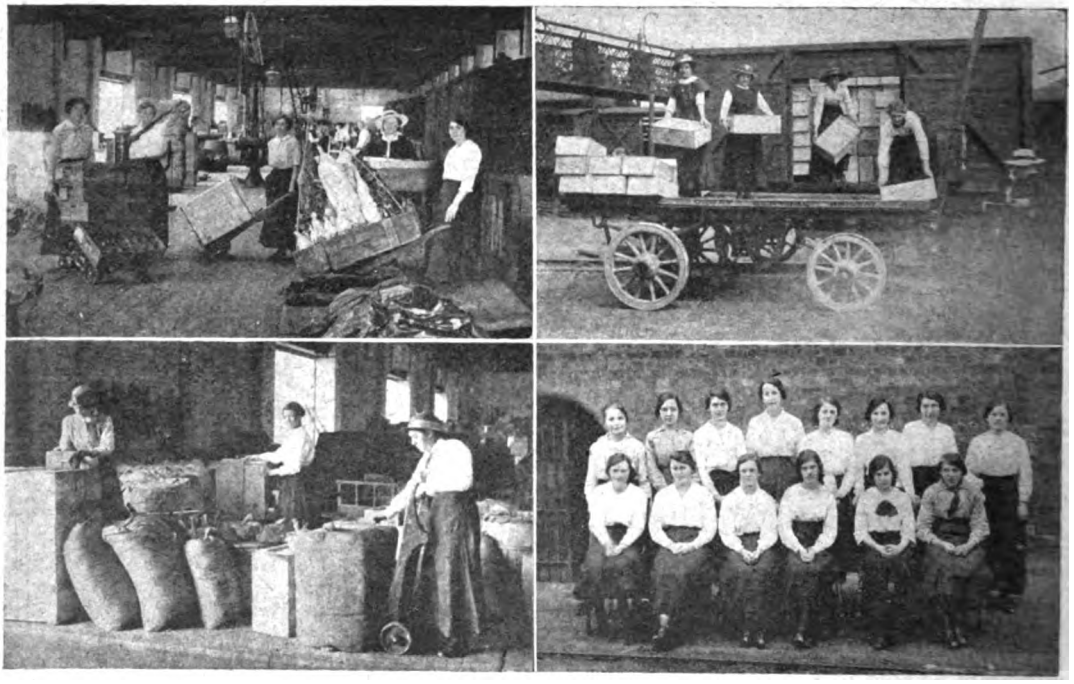
files of them, and all the paraphernalia of a busy office. Here again, the girls work in silence and with completely absorbed attention. Rebates and cartage provide their activities here. Two or three men are in charge, and have this staff of novices to train, direct, and supervise in the microscopic labours of checking all accounts and of totting up on lengthy sheets the demurrage charges, a record of which has to be kept. The work requires close attention, neat entries, and gets it."

"There is the 'Outward' department, where the staff of girls make invoices out to go with the wagons, or are engrossed in checking the wagon books. There is a delivery department where forms are made out for draymen for traffic damage to dress by a holland or print overall. At first sight there appears just a confusing and wild rush of barrow-women in all directions. But a system prevails here just as implacably as in the office departments."

"A woman checker standing at a roughly-improvised sort of desk, is stationed near a truck where a gang of four girls are unloading. She not only makes a note of every parcel and box and case, but of damages. Quick as lightning and with the seventh sense of the detective, she notes and enters her comments, while the girls, scarcely pausing for the examination, rush the cases down the gangway and wheel them at express speed to one of the 'bays' or sections which represent various districts. Back comes



*Photos]* [*Mr. Topham.*

1, 2 & 3.—WOMEN PORTERS, GRIMSBY TOWN GOODS STATION.

4.—GIRL CLERKS, GRIMSBY TOWN GOODS STATION.

into the town. Already this work is understood and executed deftly. The carter's delivery sheet is a familiar thing, and the girls at work on it are as happy and as eager as painter evolving an inspired subject from the canvas."

"Out of doors, woman's work takes another form. Here health, strength, quickness of hand and fleetness of foot are the essentials. It is a strange sight in the goods shed and at the trucks outside. Women are trundling barrows, discharging cases, boxes, barrels, every kind of goods, and loading trucks with cheerful agility. There is no uniform. The women wear ordinary clothes. Some work in hats and jackets. Others without either, and arm themselves against the barrow-women again, escaping deftly collision with another making the same circuit. A fresh train of trucks comes into the siding. Instantly the girls get to work. The vast tarpaulin sheet is untied and folded away. Then the checker and gang start at the discharging."

"Few men are left in the sheds. And of these few, more are going. But Mr. F. Patman, the able administrator of this and many other branches of the Great Central Company, is no longer troubled as to the consequences of a further depletion of men employés. He has found the women and girls in Grimsby as in other towns, equal to every task and worthy of any amount of responsibility."

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"Girl ticket-collectors are employed at the docks, New Holland, on the ferry boats, and there are women stewards on the ferry boats. At the Cleethorpes station is a splendid gang of women cleaners. Fifty-four hours a week most of these women work, and with good wages (the same as a man employé), an hour for luncheon, and special accommodation, they feel happy and very well treated."

### Curiosities of Locomotive Numeration.

REMARKS recently made as to locomotives of consecutive or associated numbers brought together in the course of traffic working have elicited several other features worthy of note. Mr. J. T. Young, of Newcastle-on-Tyne, mentions that whereas on one occasion he saw an Anglo-Scottish express worked by 4–4–0 engines Nos. 1234 and 1235, as stated last month, on a subsequent date he saw the same two engines on the 6.8 p.m. from York to Newcastle. Mr. D. R. Lysaght, of Windsor, states that recently at Paddington station he noted, standing together on the same line outside the terminus, No. 103 *Alliance* (one of the larger French compound 4–4–2 engines), No. 111 *The Great Bear* (4–6–2) and No. 2931 *Arlington Court* (4–6–0).

Instances of *three* engines of consecutive numbers must be very rare, though we have already mentioned one on the North British Railway. Mr. H. L. Hopwood writes that near Holloway, he recently noted, waiting for signals, Great Northern 0–6–0 mixed-traffic engines Nos. 1, 2 and 3 standing together.

Mr. Philip F. Groves, who is now serving with the Railway Operating Division of the Royal Engineers, mentions that recently at Birmingham he noted three consecutive trains arrive, hauled respectively by Nos. 65, 165 and 765, followed by No. 1. These were on the Midland side, but he also saw on another occasion London and North Western Railway engines Nos. 642 and 643 at the same platform, though one is a 2–4–0 and the other a "Precursor," their respective sheds being, moreover, about equi-distant in opposite directions from Birmingham. The longest series of consecutive numbers he has ever seen together is seven. We should imagine that this is almost a record. These were Great Western Railway 2–8–0 engines at Chester, where No. 1 of that railway was also in evidence. Apropos of these references to No. 1, Mr. Groves asks what is the record for "No. 1" engines noted by any reader, confining attention to lines possessing 75 or more engines. He has seen them on the London and North Western, Midland, Great Western, London and South Western, Cambrian, London, Brighton and South Coast, South Eastern and Chatham, and Somerset and Dorset Joint Railways. A Lancashire reader, Mr. E. C. Bourne, states that at Shipton he saw

*Photos]* [*Mr. Topham.*

5 & 6.—WOMEN PORTERS, GRIMSBY DOCKS STATION.

7 & 8.—WOMEN CARRIAGE CLEANERS, CLEETHORPES STATION.

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a Midland train come in with engines Nos. 440 and 441 attached.

### War-Time Traffic Working.

VARIOUS unusual features due to prevailing conditions are mentioned by correspondents. Mr. J. T. Young mentions that Great Northern Railway brake vans now often work into Newcastle-on-Tyne and beyond. Mr. H. L. Hopwood writes that about a year ago several London, Brighton and South Coast Railway troop trains and engines found their way to Tuxford (Great Northern Railway), having come *viâ* Addison Road, the London and North Western Railway, and the Joint London and North Western and Great Northern line to Newark. In fact, he describes London, Brighton and South Coast Railway engines and trains as fairly common on the Great Northern Railway. Last July he also noted a Hull and Barnsley six-wheeled passenger brake van at Gloucester. In the same month, at Reading, Great Western Railway, he saw a Great Eastern train, worked by 0–6–0 engine No. 556, proceeding to London *viâ* the relief lines.

### "Bradshaw": No. 1,000.

THE November "Bradshaw" ranks as No. 1,000. The first issue was made in December, 1841, and followed "Bradshaw's Railway Time-tables," which appeared in October, 1839. A reprint of the first number of the latter was made in 1901. It consisted of twenty-four pages, with two railway maps of Yorkshire and Lancashire respectively, and plans of Liverpool, Manchester and Leeds, in addition to the time-tables, etc. Originally, "Bradshaw" was not favoured by the railway companies, but has long been recognised as a semi-official publication, though it has always been entirely in private hands. A peculiar feature is that while the present issue is No. 1,000, it is correctly only the 900th number, an error of 100 having been made in early days, and this was never rectified. Its Quaker origin is shown by the fact that even now dates are expressed by the number of the month, as well as by name. In its latest sixpenny days "Bradshaw" included some 1,200 pages, with folding map (its present price is a war-time measure); but No. 1 comprised only some thirty-two pages.

### Volunteer Inspection by Lord French.

FOR some time Lord French has spent most of his Sundays in inspecting bodies of volunteer regiments. On a recent Sunday he achieved, by means of the Great Eastern Railway and of motor cars, somewhat of a record, inspecting battalions of volunteers, aggregating 13,000 men, at centres in Essex, Suffolk and Norfolk. In the course of the day the Field-Marshal travelled some 250 miles, covered quite a respectable number of miles on foot while inspecting the ranks of the Volunteers, and, in addition, delivered four speeches. Lord French, who was accompanied by two members of his staff, made an early departure from Liverpool Street station. Amongst those who travelled by the special train were Lieut.-Col. H. W. Thornton (General Manager, Great Eastern Railway), Mr. Wm. C. May (Chief Traffic Manager), and Major H. Wilmer (Chief Engineer). Lord French first alighted at Stratford and proceeded to West Ham, where he inspected three battalions of the Essex Volunteer Regiment. The next halt was at Chelmsford, where Lord French inspected the 2nd (Ongar) and 4th (Prittlewell) Battalions of the Essex Regiment. Earl Cadogan, County Commandant of the Suffolk Volunteer Regiment, joined the special train at Colchester and accompanied Lord French to Ipswich, where the Volunteers of the county were inspected in Gippeswyk Public Park. The final event of the day was the inspection at Crown Point Hall, Trowse, of the six battalions comprising the Norfolk Regiment, which were under the command of the Earl of Leicester, the County Commandant.

### Through the Mountains by the Grand Trunk Pacific Railway.

As one travels westward from Edmonton on the line of the Grand Trunk Pacific Railway, the mountains increase in number and size until finally they swell into the gigantic Rockies. Rising one above the other in grand array, these giants of the Rockies appear to form an impenetrable barrier against which further progress is impossible. But out from among the mountains flow the hurrying waters of the Athabaska, and here, along the valley of this river is found a way provided by Nature. This is the Yellowhead Pass, whose scenery has never failed to impress those who have had the good fortune to gaze upon it. The engineers of the Grand Trunk Pacific line have carried their lines along the south bank of the Athabaska and between the two eastern sentinels of the pass—Boule Roche Mountain and Roche a Perdrix. The Athabaska river, which extends in places to the breadth of a lake, is followed by the railway until Jasper is reached, this being the central point in the famous Jasper Park, the 4,400 square mile reserve set aside by the Dominion Government, owing to its natural loveliness, as a playground for the people for all time.

At Jasper the Athabaska river swings away southward from the Yellowhead Pass, and a magnificent view is had looking along the valley towards the point where it makes a junction with the turbulent Whirlpool river. Splendid mountains rise up on either side, and one peak in particular attracts the eye by its great height and beautiful symmetry. This fine, hitherto unnamed peak will now, it has been determined, bear the name of "Mount Cavell," in honour of the martyr nurse who died for her country, October 12th, 1915. Official action to this effect was taken at a meeting of the Geographic Board of Canada (the governing body in all matters relating to place names), held in Ottawa on March 7th, 1916. Passengers on the Grand Trunk

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Pacific can see this mountain, which is 11,200 ft. high, from Jasper station. Mount Cavell can also be reached from Jasper station by an excellent trail, and it will, no doubt, be visited by thousands of travellers in the future.

**Destination and Route Indicators.**

COMMENTING upon Mr. Francis' article under this title in the October RAILWAY MAGAZINE, a Glasgow reader, Mr. C. J. Foster, writes:—"According to Fig. 6 in the diagrams on page 231, and also in the reference to Caledonian practice on page 236, it would appear that the indicators on this line are fitted on the engines in four positions, *i.e.*, at the foot of the chimney, and three positions on the buffer beam. As 27 indications can be given with an indicator using one position on the engine, it may be inferred by your readers that by using four positions on the engine the traffic department staff of this line are presented with a complicated system of signs and wonders which would do justice to a Chinese puzzle. This is far from being the case; the arrangement being simple and practical, while it has the advantage that the drivers have only one indicator to carry and take care of instead of a supply of boards, diamonds and discs."

"There are three areas in which the indicators are used, and these are:—

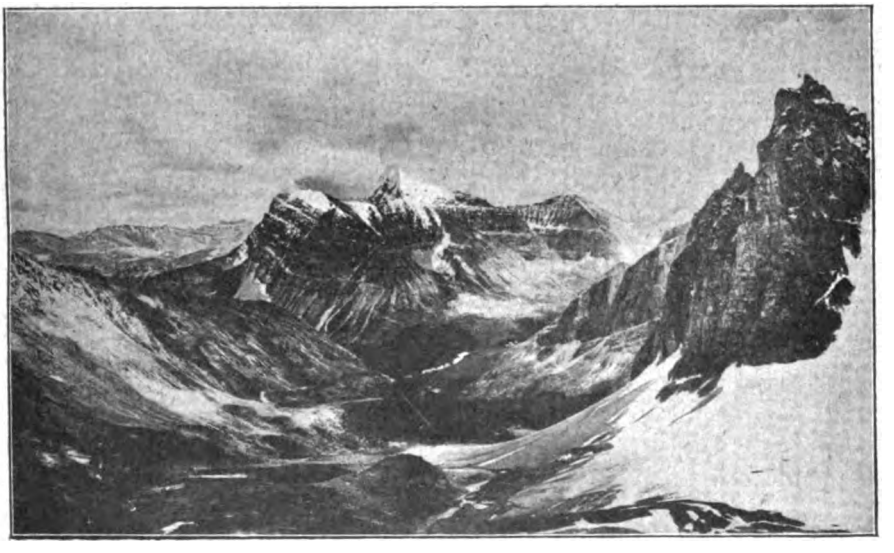
(1) Trains working to and from Glasgow (Central High Level).
(2) Trains working on the Glasgow Underground line.
(3) Trains working to and from Edinburgh (Princes Street).

The indicators in use for Glasgow (Central High Level) and Edinburgh (Princes Street) are carried in one, and only one, position. That position is at the foot of the chimney, as shown in the illustration on page 236. The trains working on the Glasgow Underground line carry the indicators in the centre of the buffer beam. Positions over the buffers on the buffer beam, as shown in the diagram on page 231, do not exist, and engines built to Caledonian standards are not fitted with studs in those positions."

**Semaphore Indicators on the Caledonian Railway.**

"THE indications in use at Glasgow have no connection with those in use at Edinburgh, except where trains from one section require to pass over the other. As instances of this, a train from Edinburgh to Gourock would carry the Glasgow and Gourock indicator, while a train from Gourock to Edinburgh would carry the Glasgow and Edinburgh indicator, the Glasgow to Edinburgh and Edinburgh to Glasgow indications being the same. Trains from the Glasgow Underground line for places served by trains from Glasgow (Central High Level) would carry the same indicator as the latter, the distinction being given by placing the former in the centre of the buffer beam. A train from the Underground line and one from Glasgow (Central High Level) to Hamilton would each show the two arms at 45 degrees right and left; but on the return journey the train for the Underground line would carry the indicator for its destination, say Maryhill, while the High Level train would carry the Glasgow and Hamilton indicator which was used on the outward trip."

"The arrangement of the indications is such that the arms of the indicators are used to point in the direction to which the trains diverge at the junctions, so far as such are available. As illustrations of this,



A STRIKING VIEW OF MOUNT CAVELL, GRAND TRUNK PACIFIC RAILWAY.



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Glasgow and Kilmarnock trains which travel *vid* Barrhead carry an indicator with one arm vertical and one angularly to the left, while Glasgow and Ardrossan trains *vid* Cathcart have one arm vertical and the other inclined upwardly to the right. The lower arm in each case points to the direction taken by the train at Pollokshields East Junction. Other trains diverging at Pollokshields East Junction are those for the Cathcart Circle line *vid* the Inner and Outer Circles, and the indications for these respective routes are similarly selected, the arms pointing to the routes taken at the junction. The system is simple, complete and compact, and for all practical working there is not one to equal it."

### Charing Cross Railway Bridge.

THAT the extraordinary action of Parliament in rejecting the South Eastern and London, Chatham and Dover Railways' Bill for powers to strengthen the older portion of the railway bridge at Charing Cross should have attracted special attention to the structure was only to be expected, but the little band of architects and others, to whose influence the action taken is primarily attributable, have lately been figuring in certain Sunday newspapers in connection with various fancy schemes for realising their ideals. We use the term "fancy" advisedly, for the method generally adopted seems to be to take a map and scheme out new thoroughfares and erections, leaving the details—which in practice will be all-important—to be settled by a later generation, for it is difficult to understand that there can be the remotest possibility of realisation until many years have passed and the country is again in a position to consider public works expenditure to the tune of many millions.

However, that is not the question at present, and we may quote the following letters which have been published:

### The Chairman's Letter.

MR. H. COSMO O. BONSOR, Chairman, South Eastern Railway, wrote under date October 27th:—

"I do not intend to be drawn at the present time into the discussion that is being carried on about the removal of this Company's bridge over the Thames at Charing Cross and its effects on the interests of my shareholders, or on the daily convenience of the travelling public who use this bridge to the extent of 18,000,000 of travellers annually, a great proportion of whom consist of the working classes carried at cheap fares."

"The first duty of my Company is to take all measures necessary for the safety and convenience of the public and to preserve the interests of the shareholders. To do this the strengthening of the Charing Cross Bridge is an urgent and pressing necessity. The Bill to give us the necessary powers was unexpectedly rejected by the House of Commons, who evidently did not appreciate the limited scope of the powers sought. Precious time has thus been lost; the Company cannot take the responsibility of risking the safety of the public by delay. There is, therefore, no alternative but to reintroduce the Bill in the present session of Parliament, and thus endeavour to obtain the necessary authority to carry out the much-needed work."

"The power asked for is to spend the comparatively small sum of £170,000 in strengthening the bridge. The large and ambitious schemes proposed by people absorbed in æsthetic and artistic ideas would, I am competently advised, take fifteen to twenty years to carry out, at a cost of many millions of money."

"The spending of the £170,000 is negligible compared with such expenditure, and can have no effect on the ultimate carrying out of any scheme which might be decided on. The question for the Company and the public is not what is to be done in fifteen or twenty years, but what is to be done in the immediate future. It is highly probable that at the end of the war the Continental and other traffic will largely increase, and it will be necessary to use the bridge to its full capacity. It is not and cannot be so used with safety until we are allowed to carry out the strengthening which, in the opinion of our engineer, is absolutely necessary."

"I have endeavoured to state the case for the public and the Company in a fair, common sense and business-like manner, and I confidently look for the support of Parliament and the public to our effective, moderate and necessary proposal."

### Sir Francis Dent.

SIR FRANCIS DENT, General Manager, was asked by *The Observer* whether he had any comment to offer on the general scheme suggested by Mr. John Burns, Sir Aston Webb and Mr. Reginald Blomfield for the removal of the railway station at Charing Cross to the opposite side of the river and the construction of a new high-level roadway bridge in place of the existing railway bridge.

"Obviously," was the reply Sir Francis made, "the scheme presented is only put forward as a general idea of what the writers of the article suggest. It would not, therefore, be quite fair to criticise the details. I must say, however, that the three gentlemen in their zeal for the improvement have not fairly represented the evidence given by the railway Managing Committee. We can only wait and see whether the authorities will take up the question of the new bridge. In the meantime there is another matter which cannot wait, and that is the strengthening of the older of the two existing bridges. This has really nothing to do with the question of the new road bridge. Whether this new road bridge is built or not, the Managing Committee is responsible for the safe conveyance of passengers to and from Charing Cross. The cheapest way and the one least inconvenient to the travelling public is that which was put forward in the Committee's Bill this year. Another way, more expensive and entailing a prolonged interruption of part of the traffic, can be adopted without Parliamentary sanction. The Managing Committee wishes to adopt the former course."

It is officially stated by the South Eastern and Chatham Railway that, pending a decision

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regarding the reconstruction of Charing Cross Bridge, certain minor strengthenings of the cross girders have been found necessary. In order to carry on the work, which is to be begun immediately, four lines passing over the bridge will be closed to traffic between 12.30 a.m. and 8.30 a.m. All early morning trains on those lines will in consequence stop at Cannon Street as a terminus instead of Charing Cross. The stations affected will be those on the Mid-Kent line, Addiscombe Road, Woodside, Clock House, Catford, and Ladywell. From these districts there are alternate routes to Victoria station and to the City. The closing of these lines between the specified hours came into force on October 30th, 1916, and will in all probability continue for some months.

### Conference Resolution.

THE proposed strengthening of Charing Cross Railway Bridge was the chief subject of discussion at the 15th Conference of East Kent Chambers of Commerce and Trade Societies, held at the Arcadian Hotel, Margate, on November 2nd, 1916. A large number of delegates were present from Broadstairs, Canterbury, Deal, Dover, Folkestone, Margate, and Ramsgate.

The following resolutions were unanimously carried:

(1) On the proposition of Mr. G. B. Richmond, Hon. Secretary of the Deal and Walmer Chamber of Commerce, seconded by Mr. C. J. Goldsack (Secretary of the Ramsgate Chamber of Commerce):—

That this Conference is of opinion that, in the interests of the County of Kent, the proposal of the South Eastern and Chatham Railway Companies to strengthen Charing Cross Bridge by an immediate expenditure of £176,000 should be sanctioned by Parliament, and that the Members of Parliament for the Divisions represented by the Conference be requested to support the Bill.

(2) On the proposition of Mr. G. W. Saxby (President of the Margate Chamber of Commerce), seconded by Mr. Reed, of Margate:—

That a report of Mr. Richmond's speech and resolution be sent to each Member of Parliament for Kent, Surrey and Sussex, and to the Mayors and Town Clerks of Boroughs and Chairmen and Clerks of District Councils and Chambers of Commerce and Trade Societies in Kent, asking them to support the Company's proposal, and, if necessary, to call public meetings on the question.

### Automatic Time Recording.

THE adoption of the automatic system of keeping record of the attendances of employés has advanced by leaps and bounds of late years, and, as the advantages of their use becomes better known, will still be more popular, for it is obvious that the self-registration of time by mechanical means, being precise and therefore just, must eventually supersede the timekeeper method altogether. Machines for this purpose are now manufactured in England in large quantities and the type of time recorder which has survived all other attempts in this direction is the unlimited card system as used for the apparatus supplied and manufactured by a British firm: The National Time Recorder Company, of Blackfriars Road, London. This company has branches in most of the principal provincial towns. They are producing as many as fourteen different models of their Patent Check Action Time Recorders, the essential improvement in these machines being that of preventing the mistakes of careless employés printing time for days in advance. This is unpreventable and therefore pardonable in ordinary time recorders of the card type, and hence the improvement is a valuable feature of the National machine.

Although the human element in timekeeping is eliminated by the adoption of the automatic system, the machines themselves have almost attained to human capabilities, for this company are making recorders for the British Government that perform all the duties usually allotted to the timekeeper of arranging for the employé to record "in" or "out"; the clock does this automatically and simply requires to be wound up once a week. In order to cope with the great demand for these time recorders the company have acquired an additional factory at 88, 89 and 90, Upper Ground Street, Blackfriars. Adjacent to the present premises, this factory, covering a floor space of 3,500 feet, is filled with the latest machinery, driven by electric power.

### Locomotives in the Portsmouth District.

ARISING out of the article on the Portsmouth Lines of the London, Brighton and South Coast Railway published in the September number, a correspondent who has recently re-visited the Portsmouth district after 21 years' interval, sends us his impressions of the changes in locomotive practice on the two lines serving this Hampshire town since his earlier visit.

On the London and South Western Railway, the Adams locomotives of various types, with the exception of the 4–4–2 side tanks, were much in evidence. The famous 0–4–2 type of mixed traffic engines, built in the "'eighties," are still evident favourites, both on goods and passenger services. Although many of the Adams 4–4–0 locomotives are now on the duplicate list, plenty of work is found for them. Occasionally they are seen on light goods trains, but they do a good deal of better-class passenger work, and our informant noticed one of them hauling a non-stop express through Eastleigh. Both these classes are practically unaltered. In most cases, but not all, the plain chimney favoured by Mr. Adams is replaced by the Drummond pattern, with beaded rim; and one or two of the 4–4–0 type carry the first pattern of Drummond boiler, as fitted to the earlier classes of 4–4–0 engines of this engineer's design. This Company retains the old and distinctive colours for its rolling-stock—light green for passenger locomotives and olive green for goods and shunting engines. An occasional

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Beattie tender was to be seen, but this engineer's distinctive boiler fittings were nowhere visible. Both the South Western and the Brighton companies have discarded the old type of number plate with raised metal figures, and the numbers are painted on the locomotives. The figures used on the Brighton line are the larger.

The disappearance of names is to be regretted for sentimental reasons. Some of Mr. R. Billinton's later 4–4–0 engines retain their titles, but in most instances the driving splashers now bear the Company's monogram or crest. The drivers, however, retain an evident fondness for the old names, and still apply them when speaking of particular engines. The old Stroudley 0–4–2 engines of the "Gladstone" class are still to be seen, and some retain their copper-capped chimneys. The Stroudley 0–4–2 side tanks are largely used for auto-train working. There is some excuse for confusion at a distance between the early Drummond South Western engines and the Brighton machines, since each Company has engines in service with safety valves on the dome. Twenty-one years ago No. 314, the original *Charles C. Macrae*, had just been built by the late Mr. R. Billinton. Now the huge Baltic tank engine of the same name, designed by his son, Mr. L. Billinton, rules the road. The original *Charles C. Macrae* is still running, but re-boilered and minus her name.

## The Naming of Locomotives.

SEVERAL readers have written regretting the disappearance of the artistic livery hitherto characteristic of locomotives of the Great Northern Railway of Ireland, in favour of a scheme of black painting, together with the removal of names from these engines. Mr. H. Wray Clark points out that the Great Northern Railway is an amalgamation including the old Ulster Railway, and he recalls that many of the names borne by Great Northern engines can be traced back to the Sharp Stewart and other engines of the Ulster and other lines. As a matter of railway policy it is obvious that a black livery will stand longer than a green one, and is particularly suitable for a time when cleaners are not available, and engines must run for longer periods between visits to the paint shop. In fact, from the economic point of view there is no justification for considering the matter in any other way. Similarly the view that a locomotive is simply a means for hauling trains, and therefore as much a machine as are those in the workshops, cannot be controverted.

Yet, in the same way that a named man-of-war, or an ocean liner, or even a river or coasting vessel, seems to possess an individuality and interest which would be lost were it denoted only by initials and numbers, so the naming of locomotives is, in our opinion, a very real asset to a railway company, more especially when historic names are perpetuated as new engines supersede those of the passing generation. It may be difficult to indicate in what way the attractiveness and interest of engines is of value to a railway; but we are decidedly of the opinion that it is good policy to preserve those features which have done so much to foster a keen and intelligent interest in railway and locomotive matters. It is sometimes contended that the development of electrical working will remove much of the romance from railway traffic. There is really no reason why electric locomotives for main line traffic should not, in time to come, be known by names now borne by steam locomotives; but while the Navy claims as one of its assets in regard to public interest the perpetuation of names which have become historic, there is every reason for regarding the possibilities afforded by our steam locomotives in a somewhat similar way. Those railways where named locomotives are still the order, for express traffic at all events, are regarded by a large section of the community, including the business world as well as by those in private life, in a more interested way than is the case on other lines. And in this connection the way is certainly open for actual benefit to accrue to the railway because of the greater public notice which is thus attracted.

## What is a Gradient?

THIS question often arises, not that the general facts are not understood, but because of certain difficulties in reading a gradient profile and in appreciating the mechanics of gradient ascent. Many years ago, the RAILWAY MAGAZINE had a lengthy series of articles dealing with the gradients of the principal railways and main routes. The numbers concerned were for a long period in considerable request, but have been out of print for several years past. In an introductory article, published in May, 1903, the Rev. W. J. Scott dealt at length with the general question of "What is a gradient?" This cannot be repeated at length, but judging from letters received, a few remarks on the subject will be in place. Mr. Scott quoted one dictionary as defining a gradient as "the degree of slope of a road," and preferred that somewhat loose description to the more elaborate one given elsewhere that "gradient in railway engineering is a term used to signify the departure of a line from the perfect level."

Both definitions are correct, and we might also add another, "that gradient is the degree of inclination with regard to the horizontal." In ordinary connections one could say that a line rises (or falls) at an angle of, say, 10 degrees; but as railways, other than rack and cable lines, have not yet been developed to emulate the now famous "tanks," and treat obstructions as level ground, measurement by angles is hardly practicable, and so it is usual to express a gradient as 1 in so many. That is a rise of 1 in the vertical direction spread over so many horizontally. The unit may vary: if feet, as usual, 1 in 100 means that for every 100 feet traversed horizontally there is a rise of 1 foot. Or the unit may be inches, yards, or chains, or furlongs or miles; but railway grades are usually too long to be considered by inches, and too short for the choice of other units. It is necessary, however, to

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remember that while one may interpret a gradient in feet, the gradient itself has nothing to do with feet or inches or any other actual measure. The point is that if 100 is marked out horizontally, then the gradient of 1 in 100 is arrived at by measuring at the end 1 vertically and connecting that point with the starting point on the horizontal line used as base.

**Percentage Grades.**

In America it is usual to take as a standard a horizontal length of 100, and measure the vertical rise effected in that distance and express it as a percentage. Thus 1 in 100 becomes 1 per cent.; but as awkward gradients then involve complicated decimals, or as is more usual, an approximate figure, the method has nothing to commend itself on the ground of exactitude. Moreover, as a large proportion of railway grades are easier than 1 in 100 it follows that percentage grades become decimals of 1 per cent.

On the basis of mechanics the work to be done in working a train over an adverse gradient consists of lifting the weight concerned through the vertical distance involved (with in addition various resistances, due to forward operation) and this is spread over the horizontal distance in question, so that speed and distance together influence whether the work is hard or relatively easy. A given power may be quite insufficient to enable 300 tons to be worked on a 1 in 100 gradient at the rate of 60 miles per hour; but may be easily spread over the greater time given by a speed of 30 miles per hour, and that is wherein lies the difficulties of maintaining high speed on severe grades, particularly if lengthy. As a rule grades of 1 in 300 or thereabouts do not become very serious unless they extend for long distances, when the sustained demand begins to tell on the engine. On the other hand a 1 in 70 grade, unless very short, becomes a great hindrance, as the work involved even to lift a train only 1 foot in every 70 is by no means light.

**Gradient Profiles.**

In regard to gradient profiles it may be remarked that exact indication of the grade by the slope of the lines, especially on a small scale, would hardly indicate any variation from the level, so that a larger scale is used for the vertical than for the horizontal. Thus, if 1 inch is used for 100 feet horizontally, the rise at the end would only be one-hundredth of an inch; so that to show anything at all it is necessary to adopt a much larger scale for vertical measurement; possibly of one inch for every 10 feet or even a lesser distance. Consequently a gradient profile may suggest terrific inclines, but has to be interpreted in regard to the respective scales used, and preferably by the figures stating the grade, with, of course, due attention to the horizontal distances over which a given gradient applies.

Gradients are usually indicated at the side of the line by doubled armed boards placed where a change occurs. One arm shows the conclusion of the grade just traversed, the other the following one, while the figures painted thereon, 1 in 100, or 1 in 253, show the rate of the grade. As a rule the arms are inclined upwards or downwards to show whether ascending or descending in the direction noted, while "level" is shown by a horizontal arm with the word painted instead of figures.


## A NOTE TO NEW READERS.

Mr. E. L. Ahrons' series of articles on "Locomotive and Train Working in the Latter Part of the 19th Century" began in January, 1915.

Subjects already dealt with are:—

**LONDON AND NORTH WESTERN RAILWAY.**
**GREAT NORTHERN RAILWAY.**
**MANCHESTER, SHEFFIELD AND LINCOLNSHIRE RAILWAY.**
**GREAT WESTERN RAILWAY.**
**GLASGOW AND SOUTH WESTERN RAILWAY.**
**NORTH EASTERN RAILWAY (in progress).**

A limited supply of these parts is still in stock. New readers desirous of obtaining copies should place their orders without delay.

Photographs of many of the locomotives illustrated can be obtained from the

**LOCOMOTIVE PUBLISHING CO., LTD., 3, Amen Corner, London, E.C.**


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# WHAT THE RAILWAYS ARE DOING

It is pleasing to record that the total receipts from the sports meeting of the War Service Corps of the Metropolitan Railway at Wembley Park in September were £135, and the expenses, including £20 for prizes and £10 cost of entertaining wounded soldiers, about £34, leaving a balance in hand of £101, which the Committee have decided shall be devoted to the following purposes: In the purchase of wool to enable the women's section to make warm garments for "Met." men at the front; in sending a monthly parcel to such of them as are prisoners of war in Germany; and in providing a small gift at Christmas for every one of the "Met." men at the front.

* * *

By the death, at the age of 82, of Sir Lesley Charles Probyn, K.C.V.O., a notable figure has departed from the railway world. Prior to joining the Board of the Great Northern Railway in 1883, Sir Lesley Probyn rendered long and distinguished service in the Financial Department of the Government of India, and was Accountant-General of Madras when he retired in 1879. Sir Lesley Probyn joined the Board of the Great Northern Railway in 1883, and was appointed Deputy-Chairman in 1895, holding that position until 1913. He continued on the Board, however, until the close of 1915, when he resigned on account of ill-health. Among other activities in England, Sir Lesley Probyn was appointed auditor of the Duchy of Cornwall in 1891, subsequently becoming a member of the Council of the Prince of Wales. In 1906 he was created a Knight Commander of the Victorian Order. Sir Lesley also served as Chairman of the Railway Clearing House.

* * *

The death of Mr. W. B. Turner, J.P., D.L., a Director of the Furness Railway, is announced. Mr. Turner, who was in his 77th year, served his articles as a mining engineer in the Furness district, and soon after the completion of his time became a partner with Mr. Edward Wadham, who was a mining engineer with a large practice in Furness and also in the Whitehaven district, also holding the position of mineral agent to the Duke of Buccleuch and other large mineral owners in the North. For the long period of 22 years Mr. Turner was a director of the Furness Railway Company, having been appointed in 1894. He was also a director of the Cleator and Workington Junction Railway. At the funeral, the Furness Railway Company was represented by Lord Muncaster (Chairman), Mr. F. J. Ramsden (Deputy Chairman), Mr. W. Burnyeat (Director), Mr. Myles Kennedy (Director), Mr. Alfred Aslett (Secretary and General Manager), Mr. R. F. Miller (Auditor), Mr. D. L. Rutherford (Engineer), Mr. Telford (Accountant), and Mr. Roseveare (Storekeeper).

* * *

The scheme adopted by the Metropolitan Railway War Service Corps (Garden Department) for supplying vegetables to Military Hospitals for the wounded, as a result of the cultivation of the Company's land at Wembley Park, has met with wonderful success in its first season of operating. The hospitals to participate have been those at Harrow, Willesden, Brondesbury, Harlesden and Eastcote. Almost every kind of vegetable has been grown. Nearly half a ton of potatoes, over 3 cwt. of beans, 114 dozen bunches of turnips, and great quantities of peas, marrows, lettuces, onions, carrots, beetroots, etc., have been produced and sent out. This is certainly an example that others with a little spare land and a willing staff of voluntary workers might copy; and many communications have been received stating that "it reflects the highest credit on the 'Met.' as pioneers in the movement."

* * *

During the night of October 11th serious damage was done to Scottish mountain lines as the result of a rainstorm which swept over Lochaber. Fort-William was entirely isolated, so far as railway communication was concerned, as numerous wash-outs had taken place on the West Highland, the Mallaig, and the Invergarry and Fort Augustus sections of the North British Railway. It was officially intimated that in consequence of the damage to the line the train services north of Rannoch station would be suspended for the time being. On the Invergarry and Fort Augustus branch the services were also suspended, while on the Mallaig extension trains could only run between Mallaig and Glenfinnan. In the course of about a week the full services were resumed.

* * *

New sidings have been put down at Denaby Great Central Railway, since the war commenced, owing to the large increase of traffic for works in the neighbourhood which have had to largely extend their plant. The sidings are situated on the down side of the main line from Doncaster to Sheffield, and the road entrance is on the Conisboro' side of the level crossing at Denaby. The site is the one upon which Messrs. Meggitts' Bone Mill stood. Some idea of the necessity of the sidings can be gathered from the



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fact that 20 wagons are unloaded daily, and about the same number loaded with outwards traffic. The whole of the porterage is performed by women, the only man that is employed there being a checker, and up to the present the women have given every satisfaction. The sidings are under the supervision of Mr. Ullyatt, goods agent, Mexborough.

* * *

MR. A. ENTWISTLE, formerly Secretary and Manager of the Cockermouth, Keswick and Penrith Railway, died recently. He was a member of the Committee of Management of the Railway Servants' Orphanage, Derby. The principal years of his railway life were passed on the London and North Western Railway.

* * *

MR. J. L. CLEWES, General Manager and Secretary of the Londonderry and Lough Swilly Railway, has been appointed Transport Manager to Messrs. Lipton, Ltd. Mr. Clewes received his training on the Midland Railway, where he obtained a wide experience in the manipulation of traffic, resulting in his appointment as general inspector to the Chief Traffic Manager, with duties covering the whole system. This position he held up to his appointment in 1912 as Manager and Accountant of the Derwent Valley Railway, which was followed by two years' experience of Irish traffic working on the Londonderry and Lough Swilly Railway.

* * *

MR. HARRY RYLANCE HAIGH, Assistant Carriage and Wagon Superintendent, Midland Railway, died recently at the age of 66 years. Mr. Haigh served his apprenticeship as an engineer in Glasgow, and his connection with the Midland Company's Carriage and Wagon Department dated from September, 1875, when he went to Derby to assist the late Mr. Thomas Gething Clayton, then Carriage and Wagon Superintendent, in laying down the machinery at the new carriage and wagon works, which were established about that time. He was appointed Outdoor Assistant to Mr. Clayton in January, 1883, and succeeded to the post of Assistant Carriage and Wagon Superintendent in June, 1909. When, in 1915, Mr. D. Bain, who succeeded the late Mr. Clayton as chief of the department in 1901, was requisitioned by the Government for important duties at the Ministry of Munitions, Mr. Haigh was called upon to assume temporary control, and he was Acting Superintendent at the time of his death.

* * *

ON Wednesday, October 11th, the orchestra of the Great Eastern Railway Musical Society paid another visit to the Convalescent Hospital at Woodcote Park, Epsom, where they entertained an audience of some 1,500 of our wounded fighting men. As on previous occasions, the Honorary Conductor, Colonel William Johnson Galloway, early intimated to the huge gathering that they were at liberty to take part in the choruses, an invitation to which the men responded with the greatest enthusiasm. The full orchestra, numbering some 70, composed of servants of the railway whose duties necessitate their retention with the Company, others of non-military age and several returned from the front wounded, was in good form, whilst the soloists, Miss Annie Bartle, soprano, Miss Minna Deacon, contralto, and Mr. F. L. Rawles, post horn, were equally successful. At the conclusion of the concert, Captain McConnell, Chaplain, called for three cheers for the entertainers, and Colonel Galloway, in response, spoke of the pleasure it gave the members to devote in this way any time they had to spare after their daily duties.

* * *

As the twenty-fourth "James Forrest" lecture, Institution of Civil Engineers, Sir John Purser Griffith, Chief Engineer, Dublin Port and Docks Board, read a most comprehensive paper on "The Development of Appliances for Handling Raw Materials and Merchandise at Ports and Other Large Centres of Traffic." As illustrations a large number of photographs and drawings were thrown on the screen as the lecture proceeded. Incidentally, several railway equipments were cited, including conveyor belt systems between railway wagons and the shipping plants installed by the Hull and Barnsley Railway and at Port Talbot. A good word was put in for railway ports, Sir John pointing out that many of these are well equipped, and, therefore, much advantaged over some of the older ports, besides which the traffic and other associations of the railways enable many factors to be co-ordinated. Most of the railway examples cited by Sir John related to the Lancashire and Yorkshire Railway, and he spoke very favourably of the system of cranes, runways, and of travelling trucks (Elwell-Parker type) used at Oldham Road goods depôt, Manchester, and in the cotton and wool warehouses of that city and at Bradford, etc. The use of flat-bottomed trays adapted to be lifted with their loads, to or from road vehicles or railway wagons, was mentioned, this system being adopted to some extent by the Lancashire and Yorkshire Railway.

* * *

WE regret to record the death of Mr. C. A. Harrison, late Chief Engineer, North Eastern Railway. He retired from active work a few years ago, but his services were retained in a consultative capacity until recently. During his tenure of office a number of important works were carried out, notably the King Edward VII. bridge at Newcastle-on-Tyne, and the River Wear bridge at Sunderland. Other works were the dock and other improvements at Hull, and the Newport-Shildon electrification, the civil engineering side of which was at first under his direction, though the later stages were dealt with by Mr. C. F. Bengough, who now holds the position of Chief Engineer.

* * *

MR. WILLIAM O. ETHERDEN, chief of the Midland Railway fire brigade, died at Derby on October 23rd. He commenced his career in June, 1881, and worked his way through every grade

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until he reached the position of Senior Superintendent of the London Fire Brigade. He obtained many distinctions and medals, and was finally invested by the King with the King's Medal. Mr. Etherden retired from the London Fire Brigade in April, 1913, to take up the position of fire chief of the Midland Railway.

* * *

MR. C. T. NEEDHAM, M.P., of Manchester, has been elected a Director of the Manchester Ship Canal Company to fill the vacancy caused by the death of Mr. John K. Bythell.

* * *

MR. E. C. BOURNE writes: "Since my last letter, I have noted the following Lancashire and Yorkshire 2–4–2 tank engines recently superheated: Nos. 693, 1050, 26 (1008 class), and 1536 (1526 class). Of the rebuilt superheater 0–6–0 goods engines I have noted Nos. 342, 474, 1123, 1073, 1307, 52, 99. The Holcombe Brook electric train service has been resumed. The overhead wires are being strengthened, to resist the wind, by support wires fastened to wooden poles. . . . All the stations on the Manchester–Bury electric line from Radcliffe to Woodlands Road (inclusive) have, besides the ordinary large signboards bearing name of station, enamelled plates placed every few yards on the station also bearing the name of the station."

* * *

MR. MALCOLM M. NIVEN states in regard to old Glasgow and South Western Railway locomotives, that No. 71A, Stirling 2–4–0, which has been working fish specials from Fairlie to Glasgow, and which Mr. Ahrons mentioned in his articles, has gone from her station at Ardrossan to be broken up at last. "With the passing of this little engine another link in the chain of Mr. Stirling's forging is broken. All that now remain on the system are the 4–4–0 7 ft. 1 in. bogies of the 191 class, rebuilt by Mr. Manson early this century. The 71 class had 6 ft. wheels and 17 in. by 24 in. cylinders."

* * *

A SCOTTISH reader remarks that the Glasgow and South Western Railway rebuilt four-cylinder engine No. 11, stationed at Hurlford (Kilmarnock), is now working chiefly between Kilmarnock and Ardrossan. He also mentions that of the Greenock "bogies" Mr. Smellie's 119 class—Nos. 119A, 120A, 125A and 128A are now pilots at St. Enoch station and work empty coach trains between there and Bellahouston carriage sidings. They are also used on the Renfrew trains. No. 140A was at Ardrossan working on the Largs trains for many years.

* * *

IN connection with his articles on the London, Chatham and Dover Railway, Mr. H. L. Hopwood points out that the name of No. 47, illustrated on page 327, should be *Templar*, and not *Tempter*. No. 1, shown on page 326, is obviously a tender engine, and not a tank as stated, due to a printers' error. The length of Sydenham Hill tunnel should be 1 mile 440 yards.

REFERRING to the painting of Great Western Railway locomotives during the war, Mr. A. Oram observes that the green now used for passenger engines is not the same colour as that previously employed. Also, the engines are painted in the same manner as those which are painted khaki; that is, without the yellow lining, though buffer beams are painted red. He has noted the following engines painted in the new green (which is not at all displeasing)—4–6–0 four-cylinder class: *Princess Eugene*, *Knight of the Golden Fleece*, *Queen Adelaide*, and *King James*; 4–6–0 two-cylinder class: *Stackpoole Court*, *Lady Disdain*, *Lady Godiva*, and *Lady of the Lake*; 4–4–0 class: *Earl of Cork*, *Pretoria*, and *Gibraltar*; a "County" tank; and the latest 2–6–0 No. 4397.

* * *

A READER in Ireland sends a page from the popular weekly *London Opinion*, wherein a cartoon shows the Kaiser with one foot, labelled "Western Front," caught in the points of a railway track, while General Hindenberg with his drawn sword is, in view of the approach of a train ("The Allies"), threatening: "The leg must come off, Your Majesty. You are trapped—it's your leg or your life." The idea is good, but as so often happens, the execution is quite out of accord with railway practice, seeing that the movable tongue of the switch is *outside the main rail*, and the latter is continuous. Our correspondent suggests that the artist probably has the impression that the flanges of the wheels run on the outside of the rails! Rather we would advise cartoonists who wish to utilise railway material to go down to the nearest station and see for themselves. If this were done there would not be so many "howlers" in our popular newspapers and periodicals.

* * *

IN reference to a paragraph on page 143 of the August RAILWAY MAGAZINE, Mr. K. Paton mentions that quite a number of the Stirling 4–4–0 and 0–6–0 engines on the South Eastern and Chatham Railway are still unrebuilt. Of the former class Nos. 22, 45, 91, 104, 137, 139, 172, 185, 198, 206, 209, 210, 211, 222 and 241 are cited. The latest of this type to have an extended smokebox is No. 21.

* * *

MR. J. A. E. JONES, of Oldham, writes as follows:—"In the August, 1916, number of the RAILWAY MAGAZINE I noticed a statement that the Great Western Railway have three distinct shades for locomotives, the usual green, the new khaki livery, and the red-brown of the auto-train engines. It may interest your readers to know that recently at Wrexham I saw one of the latter engines, a 0–4–2 tank, reserved for auto-working, painted in the new shade of khaki. Its number was 1156."

* * *

"SIX of Mr. Manson's 4–4–0 No. 8 class (6 ft. 9½ in. drivers), Glasgow and South Western Railway," states an Ayrshire reader, "have been fitted with large boilers, making them

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almost identical with the No. 240 class of 1904. The numbers of these six are :—

| | | | |
|---|---|---|---|
| No. 103 | .. | rebuilered March, | 1910 |
| ,, 77 | .. | ,, ,, | 1912 |
| ,, 115 | .. | ,, ,, | 1912 |
| ,, 171 | .. | ,, April, | 1912 |
| ,, 85 | .. | ,, ,, | 1912 |
| ,, 11 (4-cyl.) | | ,, December, | 1915." |

* * *

A CORRESPONDENT mentions : "I recently noticed another result of the unified working of British railways. A load of girders, passing over the Great Western Railway's old main line, was conveyed on Great Central bogie wagons, while the interposed 'runner wagons' belonged to the Lancashire and Yorkshire Railway."

* * *

PASSENGERS on the London and South Western Railway between Salisbury and Southampton encounter a sinister and somewhat unusual reminder of the great war. In the sidings at the Netley passenger station are generally to to be seen several newly-painted box wagons bearing the grim description "Hearse Van." The proximity of Netley Hospital explains only too readily the purpose of these vehicles.

* * *

REFERRING to the article in the September RAILWAY MAGAZINE on "The Portsmouth Services of the Brighton Railway," Mr. L. B. Hewitt points out that the old-time city of Chichester at one time had for its Member of Parliament Mr. William Huskisson, who was knocked down and killed by the *Rocket* at the opening of the Liverpool and Manchester Railway on September 15th, 1830. His memory is commemorated by a life-size statue in the cathedral of the Sussex city.

* * *

KHAKI-PAINTED coaches are now occasionally to be seen on the passenger services of the Great Western Railway.

* * *

EASTLEIGH under war conditions continues to prove a veritable Mecca of rolling stock. Recently a reader noticed the Great Western 4-4-0 locomotive No. 4150, *Begonia*, hauling a train composed of Caledonian passenger stock *en route* from Southampton.

* * *

"EARLY Opposition to Railways" is the title of an article by Mr. Harry Wardale published in the *Newcastle Weekly Chronicle* recently. The author describes how many towns have had to suffer by the fact that in early days the intrusion of railways was resented by the great landowners, with the result that many places, once on main coach routes, are now served only by branch lines, while once remote villages have become great towns.

* * *

FOR more than half-a-century London and North Western Railway steamers have made from five to ten crossings daily between England and Ireland, and as far as we can recollect, the disaster which befell the *Connemara* on the night of Friday, November 3rd, represents the first occasion on which any vessel has been lost. The *Connemara* was one of the twin-screw steamers designed more particularly for cargo service. Ordinarily she plied between Holyhead and Dublin (North Wall), but owing to the exigencies of the war has replaced the *Greenore* on the Greenore route, the latter vessel—a modern triple-screw turbine boat—now running between Holyhead and Dublin (North Wall). Unfortunately, the *Connemara* conveyed third-class passengers, for whom only is there now accommodation to and from Greenore, and this explains the loss of life due to the disaster, though had she been on a recognised passenger service, as in normal times, it might have been still greater. The *Connemara* was built in 1895, and was 280 ft. long, with a beam of 35 ft. Gross tonnage was rated at 833, indicated horse-power 3,500, and speed 14 knots. Of the aggregate of ninety-one passengers and crew only one is known to have survived—a seaman of the *Retriever*, the vessel with which the *Connemara* collided. Apparently the *Retriever* had become unmanageable in the gale, and this was primarily the cause of the disaster.

* * *

A 4-6-2 superheater passenger tank engine, the first of a new series, has just been completed at Crewe, No. 96. Further four-cylinder compound passenger engines are being converted to simple, including Nos. 1914 *Invincible* ("Jubilee" class) and 1943 *Queen Alexandra* ("Alfred the Great" class), which will shortly be running. All the new batch of four-cylinder passenger engines ("Claughton" class) are now running, and are stationed at Crewe. In place of No. 1327 *Alfred Fletcher*, which is in the Works, No. 209 *J. Bruce Ismay* is now working temporarily the 11 a.m. *ex*-Lime Street, and the 5.55 p.m. *ex*-Euston. It may not be generally known that Cambrian Railway locomotives have, for some time past, been working between Whitchurch and Crewe, over the London and North Western Railway. Although chiefly to be found on cattle and other perishable trains, they may occasionally be seen on passenger work.

* * *

A PLEASANT ceremony was held in the Great Central Railway's Boardroom at Marylebone station, when the Challenge Shield and prizes were presented to the successfu competitors in the ambulance competition recently held. Mr. Sutton Nelthorpe, one of the Directors, presided, and the distribution of the prizes was made by the Rt. Hon. Lord Faringdon, Chairman. The Rt. Hon. C. B. Stuart Wortley, K.C., M.P., and Mr. W. B. Gair (Directors); and the following officers were also present : Messrs. O. S. Holt (Secretary), J. Rostern (Chief Goods Manager), E. A. Clear (Assistant to the General Manager), E. Livesley, T. C. Higgins, W. Williams, W. G. P. Maclure, C. W. Neele, H. M. Bowden, T. H. Underwood, and J. A. Campbell.

* * *

A WELL-ATTENDED meeting of the London section of the Permanent Way Institution was held on November 2nd at the Mansion House



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Station Restaurant. Mr. H. E. Roberts, A.M.Inst.C.E., presided, and Mr. J. E. Taylor, chief inspector, London, Brighton and South Coast Railway, gave a lecture upon the "Use of the Line and Square on Permanent Way Work."

* * *

"DESIGN and Construction of Steel Railway Coaches" formed the subject of a valuable paper read before the Institution of Locomotive Engineers on Saturday, October 28th, by Mr. A. T. Houldcroft, in charge of the Steel Carriage Department of the Leeds Forge Co., Ltd. Mr. A. J. Hill, Chief Mechanical Engineer, Great Eastern Railway, Past President, occupied the chair. The paper aroused great interest and an instructive discussion followed.

* * *

MR. G. W. J. POTTER was the lecturer at the meeting of the Railway Club held on Tuesday, November 14th. His subject was "Railway Time-table Maps, Summer, 1916," and as usual Mr. Potter produced a considerable amount of interesting material. At the meeting on December 12th Mr. C. J. Allen will deal with "Minimum Gauge Railways." The annual general meeting is to be held on January 9th.

* * *

FOR the season 1916-7 the first Operating Department Efficiency Meeting arranged by the associated "Underground" Companies was held in the London General Omnibus Company's Training School, Milman's Street, Chelsea, S.W., Mr. H. E. Blain, Operating Manager, presided over an audience of about 200 officials connected with the Underground Railways, the London General Omnibus Company, and the tramway undertakings connected with the London and Suburban Group, those present including: Messrs. Murray Griffith (Director), W. E. Mandelick (Secretary), A. R. Cooper (Engineer), F. V. McMahon (Superintendent of Power), W. E. Blake (Superintendent of the Line), S. J. Webb (Passenger Agent), of the Underground Railways; Messrs. G. J. Shave (Engineer), J. P. Thomas (General Superintendent), London General Omnibus Company; Messrs. W. E. Hammond, Metropolitan Electric Tramways; A. V. Mason, South Metropolitan Tramways; W. E. Wright, South Metropolitan Tramways; and J. S. Mackinnon, London United Tramways. An address on "The Camera and the Cinema in the Operation of Transit Companies" was given by Captain A. Kozier, Superintendent of Training and Employment, London General Omnibus Company. Sections of the original educational films and slides used in the first lectures to omnibus drivers and conductors; a railway film showing a trip on the District Railway; a series of slides showing some important accidents; slides showing the advertisements and legends used in the London General Omnibus Company's "safety first" campaign; one of the latest "safety first" films from America, portraying accidents on the street railways of New York; and the new London General Omnibus Company's "safety" film intended for exhibition at cinema halls, were shown.

* * *

BY the death of Mr. Lionel W. Livesey, Secretary, the London, Chatham and Dover Railway Company loses one of its oldest and most honoured officers. Mr. Livesey had been in the service for over thirty years.

* * *

ON the nomination of the Lord Mayor, Mr. Guy Calthrop, General Manager, London and North Western Railway, has been added to His Majesty's Lieutenancy of the City of London.

* * *

MANY RAILWAY MAGAZINE readers will learn with interest that the first of the Great Western Railway French locomotives, No. 102 *La France*, has been rebuilt with the standard coned boiler and top feed apparatus.

* * *

FOR the convenience of employés, of whom there are nearly 2,000 in the Windsor Street station building at Montreal, the Canadian Pacific Railway has started a cafeteria luncheon at 15 cents in a large apartment which will accommodate 251 persons at a sitting. In the offices there are hundreds of girls, many of whom have not time to go home, or who, if they do go home, are greatly pressed for time. There is also the 30 cent luncheon upstairs, and the regular dining room with *a la carte* service; but the cafeteria is strictly for employés, male and female, who prefer to have lunch inside the building to going to restaurants or carrying it from their homes.

* * *

IT is stated that between 19,000 and 20,000 employés are now occupied at the Baldwin Locomotive Works, not including those employed in the affiliated companies at Eddystone. The Company has sufficient orders for locomotives and repair work in hand to keep the plant busy for many months to come. About 40 per cent. of the locomotive business is represented by foreign orders.

* * *

To portray to the public in Canada and elsewhere a phase of farming operations hitherto little understood, the kinematograph is to be utilised. The Canadian Pacific Railway has engaged a moving picture producer to obtain a film showing the processes of farming by means of irrigation, the place chosen for the work being the 3,000,000-acre irrigation block of the company in Southern Alberta.

* * *

A CABLE received by the High Commissioner for Canada from the Minister of the Interior states that large orders for box cars, locomotive and other railway equipment have been received from Russia by the Imperial Munitions Board at Ottawa to be placed with Canadian manufacturers. 500 steel frame box cars have been ordered for the Canadian Government Railways from the Eastern Car Company and 500 from the Canada Car Company.

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CHAIRMEN of the principal conferences of the Railway Clearing House for 1917 have been elected as follows: *General Managers' Conference:* Mr. Donald A. Matheson, General Manager, Caledonian Railway. *Superintendents' Conference:* Mr. Finlay Scott, Superintendent of the Line, London, Brighton and South Coast Railway. *Goods Managers' Conference:* Mr. I. T. Williams, Chief Goods Manager, London and North Western Railway. We hope to deal further with these appointments next month. In the present issue reference is made on another page to the appointment of Mr. C. A. Moore, General Manager, Belfast and County Down Railway, as Chairman of the Irish Railway Managers' Conference.

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COMMENCING December 1st, a relief to the 8 p.m. Anglo-Scottish express from Euston will be run at 7.45 p.m., and this will take the Stranraer sleeping saloon and through carriage, forming a new train for Stranraer giving a connection to Belfast and the North of Ireland, *viâ* Larne. The train is due at Crewe at 10.45 p.m., and Carlisle at 2 a.m.

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FOLLOWING experience with the new electric services on the Hampstead Junction routes, North London and London and North Western Railways, certain business trains are being appreciably expedited. The 9.25 a.m. Kew Bridge to Broad Street, ceases to call at Kensal Rise, Brondesbury, West End Lane, Gospel Oak, Kentish Town, Camden Town, and Dalston, and is retimed to leave Brondesbury Park at 9.37 a.m., Finchley Road at 9.40 a.m., Hampstead Heath at 9.42 a.m., Highbury at 9.49 a.m., arriving at Broad Street at 9.57 a.m. The 9.32 a.m. Richmond to Broad Street ceases to call at South Acton, Kensal Rise, Brondesbury Park, Brondesbury, West End Lane, Gospel Oak, Kentish Town, Camden Town, Highbury, and Dalston, and is retimed to leave Acton at 9.40 a.m., Willesden at 9.45 a.m., Finchley Road at 9.51 a.m., Hampstead Heath at 9.53 a.m., reaching Broad Street at 10.5 a.m. A new train for Broad Street leaves Willesden (High Level) at 9.50 a.m., serving intermediate stations, due to arrive at Broad Street at 10.18 a.m. A new train for Richmond, Saturdays excepted, leaves Willesden Junction (High Level) at 5.28 p.m. for Richmond.

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MR. J. C. MITCHELL, Treasurer to the Underground Electric Railways of London, Ltd., and, therefore, of the Metropolitan District, London Electric, City and South London, and Central London Railways, the London General Omnibus Company, and the Metropolitan Electric Tramways, has been elected President for the ensuing year of the Chartered Institute of Secretaries. Mr. John Christopher Mitchell has spent practically all his business life in the passenger transport trade of London. He was appointed to the staff of the London Road Car Co., Ltd., in 1886, by the late Mr. Archibald Grierson, C.A., then secretary, with whom he was associated for nearly 20 years, and in less than three years was appointed accountant, succeeding to the secretaryship in 1905 on the death of Mr. Grierson. In 1908, on the amalgamation of the omnibus trade in London, Mr. Mitchell was appointed secretary of the London General Omnibus Co., Ltd. He was also liquidator when the Vanguard Company became amalgamated, and in 1912, upon the consummation of the scheme for the combination of the interests of the London General with those of the Underground Electric Railways of London, Ltd., he was made comptroller, and shortly afterwards was appointed treasurer of the Underground Company and allied concerns.

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ELECTRIFICATION to Claygate, London and South Western Railway, has been completed, and a half-hourly service of electric trains between Claygate and Waterloo, covering the journey in 29 min., was introduced on Monday, November 20th.

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WITH the new year there will be considerable rearrangement of traffic on the Great Western Railway in the Bristol and Swindon district. Box Tunnel is to be closed to all traffic for at least a month to permit of re-lining of the tunnel. Certain trains will be diverted over the Salisbury branch, *viâ* Melksham and Chippenham, and others to the Badminton route.

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BARKSTONE station, Great Northern Railway (between Grantham and Hougham) will in future be named "Barkston." Loseby (between Tilton and Ingersby) is similarly re-named "Lowesby."

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THE Orchestra of the Great Eastern Railway Musical Society, numbering about 70, paid a visit to Parkeston Quay, Harwich, on the evening of November 8th, where they gave a concert in a large shed on the Quay, converted into a Recreation Hall, to a very large gathering of Naval Officers and men. The Orchestra was assisted by Miss Annie Bartle and Miss Minna Deacon, and every item of the programme, consisting largely of selections and songs beloved of the men, was heartily appreciated.

* * *

AT the 27th ordinary general meeting of the Buenos Ayres Western Railway, the Chairman, Sir Henry Bell, Bt., reported that notwithstanding the severe drought, causing the railway to carry 71,843 tons less grain than in the previous year, when the crops were nearly all carried by June 30th, this year at that date they had actually 221,237 tons of wheat alone deposited at the stations awaiting transport. There had been a large decrease of 334,727 in the number of sheep carried. The traffic would have been considerably increased had it not been for the scarcity of shipping, and high freights. These had affected prices to such an extent that it had paid growers better to feed stock than to ship grain. It was only the increased rates they

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had been allowed to charge that had enabled the railway to hold its own. In regard to new coaches on order from England, and necessarily delayed owing to the war, much of the ironwork and fittings was being shipped, and the coaches are now being constructed at the works at Liniers, mainly with native woods. The cargo tunnel in Buenos Ayres has been completed except the electrification, and has been open for service since February 15th. Meanwhile, it is being worked with steam engines. The Chairman was able to report that traffic now shows increases so far of £111,000 for the present year, and when the war is ended, and there is a return to more settled times, he anticipated a return to pre-war profits.

* * *

FORMALLY opened by the Canadian Pacific Railway on June 14th, the new North Toronto station is, according to particulars just received, a most artistic erection, combining beauty and artistic properties with utilitarian features. It is designed in the style of the Italian Renaissance freely adapted to present-day needs, and stands on the east side of Yonge Street. The building proper covers a superficial area of 114 by 75 ft., the major portion of which is occupied by the main waiting room measuring 70 ft. by 50 ft. On the west side of this room are the ticket and telegraph offices, and on the east ladies' waiting room, smoking room, lavatories and telephone booths. The clock-tower is 140 ft. high and surmounted by a 30 ft. terra-cotta spire, with four large clock dials, 8 ft. in diameter. Platforms are 20 ft. 3 in. wide by 600 ft. long and are covered by "butterfly" roofs for a distance of 360 ft., which, later on, will be extended to the full length of the platform. The roofs are of wood on steel frames supported by steel posts, and have a spread of 25 ft. extending well over cars standing alongside the platforms.

* * *

MR. F. COLIN YORK, Chief Mechanical Engineer of the Buenos Ayres and Pacific Railway, has retired after thirty-four years' service. He was born in Staffordshire and educated at Repton, passing from there to the Great Western Railway under Mr. George Armstrong, then locomotive superintendent of that line. Leaving Wolverhampton, he went to the firm of George Smith of Westminster to study civil engineering, and was engaged on a survey in North Wales. On the completion of this work he joined the Wolverhampton Engineering Company as outside assistant. Proceeding to Chili in 1881, shortly afterwards he was engaged by Messrs. Hume Bros. on the construction of the Buenos Ayres and Pacific Railway between Mercedes and Villa Mercedes. In 1885, when the line was opened to traffic to Chacabuco, he was appointed to take charge of the mechanical department. In 1886 the line was opened to Villa Mercedes, and in March, 1888, to Buenos Ayres, the total length then being 426 miles, while the mileage of the Pacific to-day is 3,535.

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A CANADIAN correspondent reports that the recent completion of the Kettle Valley Railway inaugurates a new era in the development of Southern British Columbia, opening up a new district which offers great possibilities. The country which the Kettle Valley Railway now connects with the main line of the Canadian Pacific Railway lies between Midway on the east and Spencer Bridge and Hope on the west. This connection enables a through service to be run between Nelson and Vancouver. The portion of the route lying between Hope (renamed Haig as announced last month) and Brodie may well be described as "Shakespeare Valley," for the names of the stations are taken from the great poet's plays. Thus the first station north of the Coquhalla River canyon is named Othello. Then follow Lear, Jessica, Portia, Iago, Romeo, with Coquhalla Mount, 3,300 feet above sea level. Penticton is the southern terminus of the Canadian Pacific steamers plying on the Okanagan Lake, the northern terminus being Okanagan Landing, which has a good train service through Vernon to Sicamous, on the main line of the Canadian Pacific Railway.

* * *

IN a speech at Johannesburg Sir William Hoy, General Manager of Railways and Harbours, said that 4,908 South African railwaymen were on active service, and that a request had now come from the Imperial Government for the dispatch of two companies of railwaymen for service in France.

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